In This Issue: Reconstruction Problems and the Power Situation in the West

JOURNAL OF ELECTRICITY

VOL. 42 NO. 1 SAN FRANCISCO, JANUARY 1, 1919 PER COPY, 25 CENTS

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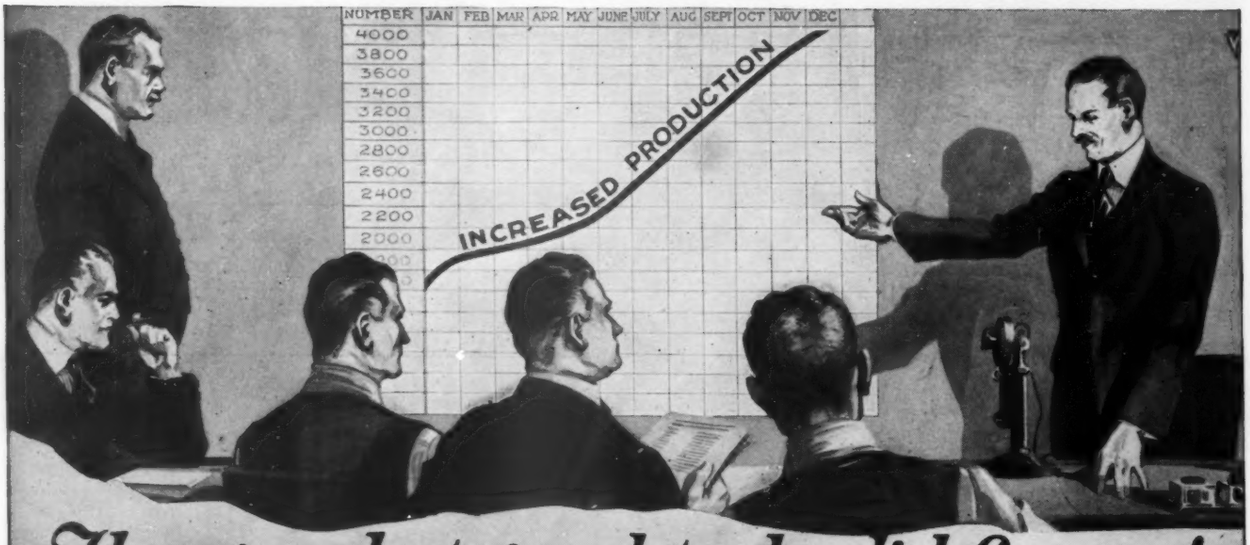

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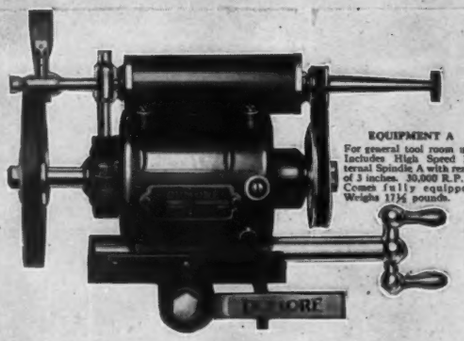

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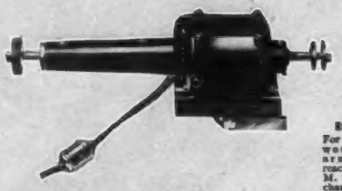

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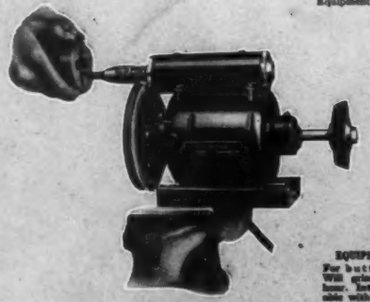

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JOURNAL OF ELECTRICITY

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TERMS OF SUBSCRIPTION: United States, Cuba and Mexico $2.50 per year; Dominion of Canada $3.50 per year; elsewhere $5.00 per year; Single Copies, current month 25c each

Entered as second class matter Jan. 1, 1917 at the San Francisco Post Office

PUBLISHED SEMI-MONTHLY BY THE

TECHNICAL PUBLISHING COMPANY

CROSSLEY BLDG., SAN FRANCISCO

Eastern Representative: GRANT ARMOR. Room 2205, 165 Broadway, New York

EDWARD B. STRONG, PRESIDENT

WILLIS M. DEMING, V. P. AND GENERAL MANAGER

ROBERT SIBLEY, SECRETARY-TREASURER

ARTHUR H. HALLORAN, ASSISTANT BUSINESS MANAGER

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WHY A SPIRIT OF OPTIMISM PERVADES THE WEST

In April, 1906, San Francisco was swept by the greatest municipal fire in history. Over twenty-eight thousand buildings, valued at one hundred and five millions of dollars, were reduced to ashes or else to gnarled and twisted brick and iron refuse. Today—but twelve years later—the rebuilt city, in which over half a billion dollars has been expended, stands forth as a monument to the bravery and to the daring of citizens of the great West. This is but one instance of what has transpired in the great district west of the Rocky Mountains during the last score of years that have so trained its citizens in the spirit of enterprise and daring as to make them see in the immediate years of reconstruction that now face the world, the most wonderful and promising for the West that it has ever experienced during its eventful life. From Los Angeles and San Diego on the South on up through San Francisco, Portland, Seattle and the inland centers of Spokane, Butte and Salt Lake City a wonderful optimism prevails.

JAN -6 1919 ©CLB425378

JOURNAL OF ELECTRICITY

DEVOTED TO THE UPBUILDING OF THE ELECTRICAL INDUSTRY IN THE WEST AND IN THE COUNTRIES BORDERING THE GREAT PACIFIC

Volume 42 SAN FRANCISCO, JANUARY 1, 1919 Number 1

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THE GREATEST RECONSTRUCTION PROBLEM of them all is not in the rebuilding of devastated cities, the launching of a rehabilitated merchant marine, nor in the reestablishing of national bounds, but rather in the readjustment of the human consciousness to think in world terms affecting labor, capital, food and supplies. Are you still engaged with the microscope in magnifying petty local difficulties or is your vision being turned to search the far distant horizon, with due care that the cap is off the telescope and that you are not looking through the wrong end of the transit?

Problems of Reconstruction

The word "reconstruction" in its literal sense does not enter very deeply into the material life of the United States. We have had no cities destroyed, our political system has not been overthrown, and thank God, our actual loss of life has been comparatively small. We have, of course, our critical problems of readjustment. Capital will have to shift from war to peace time industries, labor must find a new channel as the many war factories are closed and the army disbanded, women must be fitted into their normal place in the shop and office. In many respects we shall never return again to prewar conditions. The spirit of daring and willingness to try new fields will undoubtedly be brought back by the boys—as it has also to a certain extent affected those at home. With big things going on and revolutionary personal histories of friends to contemplate, workers of both sexes have looked to broader fields and have not been unwilling to tear up the conservative roots of years of experiment. This is no less true of capital. The many war inventions which have been made good on the battlefield have fired the imagination of the public—and the money which is freed from war enterprises will be available to finance experiments, some good, some doomed to failure.

In this readjustment, engineering works of reclamation and power development stand out most clearly as national necessities and it is electrical inventions and experiments which undoubtedly will have the larger share among the new enterprises. Some of the larger adjustments which far-sighted men see before us — and suggestions of the best methods of their accomplishment—are reviewed in the following pages by men in close touch with the problems they discuss. There are many radical suggestions made—but in building anew there is little reason for repeating errors and the present is a good time to take count of stock and make improvements.

But beyond these problems of our immediate communities and prerequisite to their solution lies the great problem of world reconstruction. If we have been in large part spared, the world has not—and no lesson has been more forcibly driven home to us than that the world's problem is our own. It is well for us to remember that if the United States might conceivably continue without a league of nations, Europe cannot—and we shall not be more willing in the future than in the past to remain spectators. We cannot afford to consider complacently the possibility of further world wars and prepare for them—we must attempt the removal of the causes of such conflict.

These are not visionary questions, nor ideals without the province of business, but very concrete essentials to the building of our national and local structure. And to no other branch of industry does the burden fall more heavily for building the all-embracing constructive vision that can harmoniously solve these problems than that of the electrical industry. In the West such movements as the California Electrical Cooperative Campaign are beginnings in the right direction. The time for thinkers has come. May the New Year still further bless us with vision to so further this spirit of helpfulness that our energies and efforts will be felt beyond the limitations of provincialism and pass across the seas to bless all mankind in the betterment of a higher, more remunerative, more helpful industry.

Moved!

With this issue the Journal of Electricity moves to its new quarters, occupying the entire fourth floor of the Electric Building, 171 Second Street, San Francisco. The newness of life and the vigor of its buoyant spirit that have pervaded the activities of the Journal of Electricity during recent months have brought about a splendid growth in its publishing influence and the result is

that the old quarters in the Crossley Building have proved entirely inadequate.

The feeling of optimism that is reaching out in every nook and corner throughout the West looking toward great things in engineering and commercial activity for the coming year has led its directors to secure these new quarters, where ample space is provided for its continued growth and the widening of its influence. These new quarters, which are located in the heart of the electrical supply district of San Francisco, should offer to the industry a bigger and broader opportunity for closer cooperation with the industry and its leaders.

The new year finds the Journal of Electricity in the prime of its life at the age of thirty-one years. Its editorial worth is month by month being felt throughout the nation and the engineering and trade press of four continents are liberal in quotations and personal mention of its columns.

The one New Year's resolution and fond hope for the Journal of Electricity is that it may be privileged to continue to hew close to the line in assisting the commercial and industrial development of the great West and the countries bordering the Pacific and that in doing so it may have a part in bringing into existence a healthier, more wholesome and more prosperous district in the vast section of country it so conscientiously serves.

The Growing Interest in Pulverized Fuel

The shortage of power in the West and the high cost of fuel—especially fuel oil—has led engineers in recent months to give unusual thought and study to the use of fuel substitutes.

At Portland, for instance, the Northwestern Electric Company is erecting a plant under the able design of C. R. Weymouth, chief engineer of Chas. C. Moore & Company, to burn sawmill refuse at a very low cost. While there are no fuel economizers installed and the condenser will give only moderate vacuum still by the utilization of this fuel, the plant will be enabled to operate with yearly cost of power that will be a minimum for the particular fuel to be burned. While such plants cannot from their very nature operate at record breaking economies still their use is to be highly recommended from the standpoint of overall cost of power production in the use of fuel substitutes.

Coming down into California, where fuel oil is at a premium, the use of a number of fuel substitutes has been under consideration. At Bakersfield, for instance, the San Joaquin Light & Power Corporation, under the constructive vision of A. C. Balch, is now operating its steam auxiliary plant on natural gas, piped from the oil field some miles distant. This new departure is being watched with considerable interest by engineers generally.

Perhaps the most interest in fuel substitutes is, however, centering in the investigation of the possibility of utilization of low grade lignite coals that are to be found in such large deposits throughout the West. This interest culminated recently in San Francisco where E. C. Jones, the able chairman of the San Francisco Section of the American Society of Mechanical Engineers, and an engineer who has had considerable experience in the investigation of the use of lignites for the production of producer gas, called a noonday meeting at the Engineers' Club at which time he introduced M. C. M. Hatch, an engineer of the Locomotive Pulverized Fuel Company of New York City, who presented to a thoroughly representative group of engineers an excellent paper on the present status of the use of pulverized fuel.

Mr. Hatch's forecast on the possibilities of the utilization of the lignite fields of California in the powdered form were illuminating and intensely interesting.

According to data furnished from the most reliable sources the lignite deposits of the state of California aggregate, probably, not less than 100,000,000 short tons. It is a valuable fuel although, up to the present time, comparatively little has been done to exploit its general and commercial use. The latent possibilities of this amount of heat producing material may be analyzed as follows: Assuming an average B.t.u. content of 10,500 and a combined furnace and boiler efficiency of 75%, which may easily be attained by proper firing in pulverized form, the boiler horsepower generated would be equivalent to that produced by the use of over 330,000,000 barrels of fuel oil of 18,500 B.t.u. content and at a combined efficiency of 80%.

In other words, if the lignite of the state should be employed as a steam producer, the above quantity of fuel oil would be released for other purposes. Also, the difference in cost, to produce the same number of horsepower hours would be, assuming the lignite to cost $5.00 per short ton as fired and the oil $2.00 per barrel, $160,000,000 or nearly 25% reduction in favor of the pulverized lignite. It would seem that this saving was of sufficient magnitude to be of interest to all concerned in steam production in California.

The entire matter is of such current interest that the use of these lignite deposits in some of the great steam auxiliary power plants of the West will unquestionably prove an early advent in central station operation. In view of this fact an active investigation and installation of a steam electric unit fired by pulverized fuel taken from the lignite deposits of the West is to be hoped for at an early date.

A New Advance in Radio Communication

Not the least of the great developments which have been an immediate result of the World's War, and one in which our readers are particularly interested, is that of the application of radio science to telephonic communication.

This application is especially near to the heart of men of the electrical industry in the West, as it has been made not only possible but practical in every-day use as a result of many years' study and work of a California boy, O. B. Moorhead, whose laboratory is situated in San Francisco. The practical form his work has taken has been brought to a high state of perfection, particularly as regards quantity production in the "hard vacuum valve" of the three concentric element type which has been for some time produced at the rate of one thousand a

day for the use of the British and Allied Governments.

For the benefit of those readers who are not familiar with this device it will not be out of place to state that in modern radio this one appliance takes the place of several of the most important details which were previously employed, such as transmitters, interrupters, detectors, tikkers, and such vital details as were necessary to make radio communication a practical science.

Primarily the feature which distinguishes the Moorhead apparatus from all others is its unformity, a most essential feature in quantity production of accurate appliances, and by reason of this uniformity, the apparatus to which the valve is applied has been made under service conditions with practically no forms of adjustment. What this means in huge armies can readily be appreciated by anybody who is familiar with the handling and adjustment of scientific apparatus.

The application of vacuum valves to radio work has been carried on commercially since 1906, and after ten years of hand manufacture of such apparatus and all the experience gained in that time, Professor Fleming, the original patentee of the Hot-Cathode two element valve, stated that no two valves could be made alike, this opinion evidently having been arrived at by reason of the extreme accuracy necessary in all the mechanical and electrical dimensions to which the finished valve must comply.

It is now true, nevertheless, that firms who are making vacuum valves by hand experience great difficulties in the matter of uniformity, and that the amount of rejections for imperfections is extremely high. On the contrary the Moorhead valve, which must pass a very rigid series of electrical tests, has proved its uniformity beyond question, and the percentage of rejections for every possible cause is extremely low.

Up to the present time these valves have been produced to a standard specification to operate all types of radio sets, and naturally such a procedure does not lead to the maximum combined efficiency. Immediate steps are being taken, however, to manufacture in quantity production various standardized types of radio apparatus, each one of which is specially designed around a vacuum valve or combination thereof which will be used as the vital factor in the sets.

By such means an advance will be made in radio work which has never before been attempted or been possible, and the time is evidently near when the attention of the radio world will be turned to the West as the center of advanced thought and development in matters of radio communication.

Commercial Growth in Latin America

Men of the electrical industry throughout the West will be interested in the summary of commercial relations with Latin America for the year just past. As shown in brief, the total trade amounts to one and three-quarter billions of dollars, showing an increase over the pre-war period of 1913-14 of 325 per cent — 257 per cent in exports and 214 per cent increase in imports.

But men of the West view with especial interest the fact that the greatest increase in volume and in per cent has been with the great republics of Argentina and Chile, our commercial relations having increased by 240 per cent with the former and 375 per cent with the latter nation.

Such giant growth in commercial and engineering relations with neighbors of the Pacific or countries closely bordering its waters means much for the future industrial and commercial supremacy of the West.

The Courtesies Due the Flag

The present crisis has led very properly to a greater respect for the symbol of our national life—the stars and stripes. Each citizen will do well to observe with increasing thouhghtfulness the little formalities and courtesies due the flag that tradition has handed down to us.

Now that the thrill and urge of war has somewhat subsided and peaceful pursuits are coming back into our vision, this courtesy should be remembered with especial emphasis.

One little incident that will long be remembered by those present was brought out at the Del Monte Electrical Convention last May.

The president of the convention, a former captain in the United States Army and a graduate of West Point, would not proceed with the opening of the session until the flag, which draped the speakers' stand, was relieved of the gavel and parliamentary books that rested upon it and until the corners of the flag were properly prevented from drooping upon the floor.

That nothing should ever rest upon the flag with the possible exception of the Bible is indeed a tradition in our national life well worth impressing upon citizens everywhere. Too often this beautiful custom is thoughtlessly overlooked. An instance of this is found in the beautiful poster designs put out recently by the U. S. Food Administration. A poster representing an ear of corn, for instance, upon a flag resting upon a table presents a most effective mental picture, at the same time it violates the time honored courtesy for the flag above referred to.

Too much care can not be exercised in instilling an ever increasing regard and affection for our national emblem.

THE NEW JOURNAL SERVICE: Salvage of the waste is the best way to clear your decks for action in order to make way for the era of readjustment now before men of the electrical industry. As to how the great Southern California Edison Company is accomplishing this task will be featured in the issue of January 15, 1919, by H. N. Sessions, a commercial engineer of this company who has done able and effective work in turning waste material into assets. How the salesman can better his efficiency will be the subject matter of a series of articles beginning February 1, 1919, by H. A. Lemmon, salesmanager of the Truckee River General Electric Company, and a writer of national reputation who has put into practice in a most effective manner the live advice he gives — incidentally, too, he gives it in a way that is highly amusing and edifying.

WATER POWER SITUATION ON THE PACIFIC COAST

BY MAJOR GEORGE F. SEVER

(The power shortage experienced in the West was not wholly a product of the war, except as natural expansion was in some part crippled by the restrictions imposed. One of the vital parts of this period, therefore, is to be the extension of power development to meet the new industries and agricultural growth. The following survey of such projects now in progress in California and others which await development is made by the representative of the War Industried Board on the Pacific Coast. The paper was one presented before the San Francisco Section of the A. S. C. E.—The Editor.)

The Power Shortage

It was early realized that in California there was a power shortage in connection with the supply of power for war industries, war essentials, public necessities and non-war essentials, this having been brought about by increased demands, and what was more serious, the shortage of water caused by a lack of snow and rain during the previous seasons. Not only was there an actual shortage of hydroelectric generating capacity, but there was also a shortage of steam generating capacity; and besides these conditions there was also a further prospect of a large increase of load during the coming year. Another important factor in the operation of the companies was the increased use of fuel oil at the rapidly increasing prices. The price of fuel oil had risen from 50c per barrel in August, 1915, to $1.20 in January, 1917, and to $1.60 in April, 1918. It was desirable to discontinue the use of fuel oil at the earliest moment in order to reduce operating expenses, as well as to conserve the fuel oil supply. In 1917 the three companies serving in the central and northern territory consumed for electric supply only 1,391,478 barrels. If the average price had been $1.34 per barrel the cost for this fuel supply would have been $1,864,000 per annum. The consumption of the same three companies for the first 11½ months of 1918 has been 1,998,194 barrels, and if the assumption is made that the rate obtains for the last half of December, the consumption for the year of 1918 will be 2,047,303 barrels. The average price during 1918, outside of earlier contracts, is $1.55 per barrel, so that the total cost of the oil burned by these three companies is $3,180,000. Much of this can be saved through the early development of hydro-power. At the average rate of 200 kilowatt hours per barrel of oil, the above amount would have developed 409,460,000 kw-hr. Reference will be made to this in discussing the proposed hydro-electric developments.

A Survey of the Situation

Before reaching any conclusions as to definite recommendations, the author deemed it necessary to make detailed inspections of the important power systems which supplied power to the different industrial centers in the northern and central portions of the state. He also investigated the southern tier of electric power companies to ascertain what their capacity and demands were, and the classes of service which they were supplying. A study of the classes of the consumers showed very clearly that on some systems the largest loads consisted of the electric power supplied to electric railways, while the next in quantity was gold dredging and hydraulic mining, as well as other mining operations. The next in order was the power supplied for irrigation; then followed general lighting, chemical and powder works, smelters, cement manufacture, iron works, foundries and machine shops, shipbuilding, and last, unclassified factories, but many of these could be classed as essential industries. One of the points in the work is to ascertain the relative importance of the industries which use electric power in those places where there is a serious shortage of power. Where there is a shortage the non-war essential industries are discontinued and the power thus made available supplied to the industries working on war essentials or war industries. In California it appeared that most of the electric power systems were supplying from 80% to 95% of their power output to war industries, war essentials and public necessities, so that it became practically impossible to gain any large amount of electric power for additional war needs through cutting off the very small per cent of power used by non-war essentials. In order to conserve what power there was it became necessary for the Power Administrator for the central and northern part of the state to curtail the use of power in the cement industry, the gold dredging operations and in the electric railway systems by means of skip-stops and decreases in service, and to a small degree by eliminating unnecessary street lights and sign lighting, and introducing so-called "lightless nights." It was necessary to maintain the supply of power for irrigation, chemical and powder works, shipbuilding and iron works, flour mills and other industries supplying war industries and public necessities. A situation developed whereby it became necessary to use fuel oil in large quantities for the operation of the steam stations, in order to conserve the available water which was contained in the natural flow of the streams, and also in storage in those systems where storage was provided. With the rising cost of oil this developed an expensive operating condition, and possessed with the information that oil is liable to remain at the figure it has now reached, there has entered into the problem of electric power supply a new and serious factor which warrants an early and large development of hydro-electric power.

The Regions of Shortage

In laying out a program for meeting the power deficiency it was necessary to consider what could be secured during one, two and three years. It was felt that the war might last at least until 1920, and consequently it was necessary to lay out a program which would provide for power to meet the present deficiency, the natural increase plus the power needed for additional war contracts, and that amount which was deemed necessary to conserve fuel oil as used by the public utility steam plants. It is on the

basis of this program that the developments have been made.

In the first place it was desirable to secure developments which could be made inside a year, then those that could be made available inside of two years, and further, those that might be brought in within three years, thus meeting the above arranged program.

There are within the industrial districts of the central and northern part of the state six important power companies known as the California-Oregon Power Company, The Northern California Power Company, The Pacific Gas and Electric Company, The Great Western Power Company, The Western States Gas and Electric Company and the Sierra and San Francisco Power Company.

There is no shortage of electric power, nor has there been any, on the system of the California-Oregon Power Company, and investigations show that there was no shortage on the system of the Northern California Power Company. There has been a shortage of power on the systems of the Pacific Gas and Electric Company, the Great Western Power Company and the Sierra and San Francisco Power Company, and in the investigating particular attention has been paid to these three companies, as each of them has developments which can be easily and quickly made to meet the program which it is suggested should be followed. Each one of these companies has a fundamental development which is in use now for power supply purposes, and each one has a steam standby service which enables them to carry a portion of their load when there is trouble on the transmission lines from the hydro-electric supply. The steam stations also act as a means of regulating the voltage and for taking the short time peaks on the systems.

The Pacific Gas and Electric System

After a careful inspection of the various developments, the author's recommendations as to the work that should be done on the Pacific Gas and Electric System are the raising of the dam at Fordyce Lake 21 feet so as to allow 11,800 acre ft. of storage, this water being spilled into Lake Spaulding and then put through the Spaulding, Drum, Halsey and Wire power stations, and later in time through a No. 2 station which is recommended to be built. The Fordyce Dam is of the rock filled type, with a wooden facing, and the 21 feet increase in height is the most economical construction that can be secured. If it should be raised a greater height there would be required a largely increased expenditure which is not now warranted.

The second item is the raising of Lake Spaulding Dam 10 feet so as to add 6,423 acre feet to the storage in this important reservoir. The additional water is intended to be passed through the Drum and other stations mentioned above and also the No. 2 station, the construction of which is in contemplation. Besides these two increases in storage capacities, there is what is known as the "Bowman-Spaulding Project," which will add a large storage capacity to the system, and the water would be spilled into Lake Spaulding. The building of a No. 2 station on the Bear River, with a capacity of 25,000 kilowatts will, together with the present stations and the additional storage, provide 233,000,000 additional kilowatt-hours to the Pacific Gas and Electric Company's system. The cost of these improvements is approximately $7,200,000. In addition to these hydro-developments on the Pacific Gas and Electric Company's system, there will be installed in Station "A" in San Francisco, and Station "C" in Oakland, the full complement of boilers so as to make the electric generating apparatus fully available. The cost of these steam additions will be approximately $525,000. Heretofore the practice has been on this coast to equip a steam station with only a sufficient number of boilers to operate generating machinery to give good regulation, to take a portion of the load in case of trouble on the transmission line and to handle the peaks during the so-called rush hours or periods. It is also used to build up load which later can be transferred en bloc to a hydro plant which has been under construction for some time. The table attached shows the details of the proposed developments on this system.

PACIFIC GAS AND ELECTRIC COMPANY PROJECTS

Table 1

Item.	Added Storage, Acre ft.	Additional Energy Available with Present Installations, Kw-hrs. per year. (A)	Additional Energy Available after New P.H. is installed, Kw-hrs. per year. (B)	Total Cost.	Bbls. of Oil Saved per year @ 200 kw-hr. per bbl.
Construct No. 2 PowerHouse—25,000 kw.			92,500,000	$5,184,300	462,500
Raising Fordyce Dam 21 ft.	11,800	17,700,000	26,550,000	300,000	132,750
Raising Spaulding Dam 10 ft.	6,423	9,634,500	14,451,700	150,000	72,260
Bowman-Spaulding Project	42,275	69,600,000	99,600,000	1,566,000	498,000
Totals	60,498	96,600,500	233,101,700	$7,200,300	1,165,510

The Great Western Power Company's System

The next important addition to the power capacity is that of the Great Western Power Company in their proposed development of a 40,000 kilowatt station on the Feather River at Butt Valley. It is proposed to run a tunnel 11,800 feet long from Lake Almanor into Butt Valley, and thence by another tunnel 10,400 feet long to the point of drop into the Feather River, dropping this water 1,155 feet into the power station located in the bed of the canyon. This project will cost in the vicinity of $6,000,000 and will take about two to two and one-half years to construct.

The following table illustrates the results which may be accomplished by this development.

Table 2

Generating Capacity	Kilowatt Hrs. Generated	Load Factor, %	Kilowatt Hrs. sold to consumers Generated × 75% efficiency
40,000 kw.	350,400,000	100	265,000,000
	265,000,000	75	199,000,000
	175,000,000	50	131,400,000

Improvements on the Sierra and San Francisco System

The Sierra and San Francisco Power Company has its power station and reservoirs in and about the Stanislaus National Forest Reserve and on the Stanislaus River. This company is in a position to supply power at the earliest date. It has two reservoirs in operation, known as the "Relief" (14,965 acre feet) and "Strawberry" (17,900 acre feet). It

has in prospect another reservoir known as "Big Dam" (16,654 acre feet), which would spill its water into "Strawberry." At the present time water from the South Fork of the Stanislaus and "Strawberry" is running in what is known as the "Philadelphia Ditch," at the rate of 50 second feet, which spills from a height of 1,860 feet at Spring Gap into the Middle Fork of the Stanislaus River, and is diverted at the Sand Bar Dam into the present flume to the Stanislaus Power Station. It is proposed to put a power station at the foot of this present spillway near Baker's Crossing containing a 9,000 kilowatt generator, and later, when the size of the ditch has been increased to accommodate 100 second feet, to add another 9,000 kilowatt unit at this point, thus giving 18,000 kilowatts additional development. At the same time an increase in the size of the penstock at the Stanislaus Power Station will gain 7,000 kilowatts which is now lost in friction head. This will make available the total capacity of 40,000 kilowatts at the Stanislaus Station.

There is also contemplated in connection with the North Beach steam station of this company an increase in the boiler capacity so as to make the three 9,000 kilowatt units available for full operation. The cost of these additions will approximate $3,000,000 and will take from one year to three years for the completion of the individual details.

The following is the tabulation of the developments on the Sierra and San Francisco Power Company system:

Table 3

Location of Developments and year of completion.	Character of Development.	Increased Kw-hrs. per annum.	Cost Estimated.	Bbls. of oil Equivalent @ 200 kw-hrs. per barrel.
Spring Gap No. 1 1 year	20 mile line 9000 kw.	62% load factor 49,000,000	$750,000.00	245,000
Spring Gap No. 2 2½ years	generator 9000 kw. generator. Trans. line Stanislaus to Manteca	48,890,000 19,710,000 Stanislaus	400,000.00 200,000.00	343,000
	Increase Philadelphia Ditch to 100 second feet	68,600,000	40,000.00	
			$640,000.00	
Stanislaus Plant	Add new pipe line at plant	15,000,000	125,000.00	75,000
Big Dam	Erect dam at Big Dam 16,100 acre ft.	40,800,000	750,000.00	204,000
North Beach	Boilers to be added to give 11,000 kw.	24,000,000 at 25% load factor	200,000.00	120,000
			Contingencies 246,500.00	
	Totals,	132,600,000	$2,711,000.00	867,000
				120,000
				707,000

BARRELS OF OIL USED AND KW-HR. GENERATED BY STEAM 1918, AND KW-HR. AVAILABLE BY DEVELOPMENT

Table 4

Company.	Kw.hr. Generated & Kw-hr. per barrel.	Kw-hr. from New Developments, Estimated.	Barrels of oil burned to Dec. 15, 1918
			Whole Yr. Est.
10 mos. P. G. & E. Co.	Est. 312,000,000 (268)	Est. 233,101,700	1,136,072.15
			1,168,100.86
10 mos. G. W. P. Co.	92,500,000 (195)	209,000,000	468,547
			472,630
10 mos. S. & S. F. P. Co.	71,700,000 (176)	132,600,000	393,575
			406,573
10 mos. Total.	476,200,000 (232)	565,701,700	1,998,194.15
			2,047,730.30

PACIFIC GAS AND ELECTRIC COMPANY

Table 5A

Date	HYDRO KW. High Water	HYDRO KW. Low Water	STEAM KW. Normal Rating	STEAM KW. 2 hr. Sustained	CAPACITY KW. Favorable	CAPACITY KW. Unfavorable
	122,600	90,000 Surplus under Favorable Conditions	75,000 Surplus under Unfavorable Conditions	60,000	197,000	150,000
	Max. Kw. Demand					
1917	158,270	38,730	8,270			
1918	174,100	23,500	24,100			
1919	191,500	5,500	41,500			
1920	210,000	13,000	60,600			

GREAT WESTERN POWER COMPANY

Table 5B

Date	HYDRO KW. High Water	HYDRO KW. Low Water	STEAM KW. Normal Rating	STEAM KW. 2 hr. Sustained	CAPACITY KW. Favorable	CAPACITY KW. Unfavorable
	70,000	56,000 Surplus under Favorable Capacity	21,750 Surplus under Unfavorable Capacity	23,950	93,950	77,750
	Max. Kw. Demand					
1917	75,400	18,550	2,350			
1918	75,480	18,470	2,270			
1919	82,500	11,450	4,750			
1920	87,000	6,950	9,250			

SIERRA AND SAN FRANCISCO POWER COMPANY

Table 5C

Date	HYDRO KW. High Water	HYDRO KW. Low Water	STEAM KW. Normal Rating	STEAM KW. 2 hr. Sustained	CAPACITY KW. Favorable	CAPACITY KW. Unfavorable
	36,320	10,800 Surplus under Favorable Conditions	17,000 Surplus under Unfavorable Conditions	20,000 (24,000)P	53,320	30,800
	Max. Kw. Demand					
1917	45,270	8,050	14,470			
1918	46,834	6,386	16,134			
1919	50,645	2,675	19,845			
1920	54,645	(Est.)	23,845			

EXPLANATION OF TABLES

Referring to Table 4, there are shown in column 1 the barrels of oil burned for the first 11½ months of 1918, and also the estimated barrels of oil for the whole year of 1918. Column 2 shows the kw-hr. generated by steam as estimated by the companies, and column 3 shows the kw-hr. which it is estimated will produced by the new developments on the three systems. The total of column 3 shows 565,701,000 kw-hr., whereas the kw-hr. generated by steam is 476,000,000. This clearly shows that the proposed developments would more than take care of the steam generated kw-hr. if they were of the same amount in the future, as obtained during the year 1918. More than this, however, is necessary, which should be provided by hydroelectric power.

Tables 5A, B, C and D show for each system and the total combined systems the surplus kw-hr. under the most favorable condition of hydro and steam generation, and also the most unfavorable conditions of the generating capacity. In each case the actual maximum demand for 1917 and 1918, and the estimated maximum demands in 1919 and 1920 are deducted from the best and the worst possible conditions. The difference shows the surplus and the deficiencies in each case.

In Table 5D, which is the summary of the individual columns, there is shown to be in 1919 under the most favorable conditions and without taking into consideration the diversity between the three systems, a surplus of 19,625 kw., which is only 6.05% of the total maximum demand, and under the very worst conditions that would obtain in that year, on the assumption that the water is low and every bad condition is coincident, there would be a deficiency of 66,095 kw. In 1920 the conditions are even worse, unless additional equipment is provided. Actual conditions that

SUMMARY

Table 5D

DATE	Capacity / Maximum Demand	Favorable: Surplus under Favorable Conditions	Unfavorable: Surplus under Unfavorable Conditions 100%
	Capacity	344,270	258,550
1917	278,940	65,330	20,390
1918	296,514	47,756	27,964
1919	324,645	19,625	66,095
1920	351,645	7,375	93,095

will obtain lie between the most favorable and most unfavorable conditions, and it must not be understood that the most unfavorable conditions will ever exist.

The deficiency in power during the last year approximated 25,000 kw. for safe operating, and as the normal growth is between 20,000 and 25,000 kw. there is great need for increased generating capacity. Besides this need there is the further need for the replacement of the use of fuel oil by hydroelectric development, and this should be carried out at the rate of about 50,000 kw. per annum until the oil generated power is reduced to a safe and economical value.

Other Power Developments

Besides the previous developments which the writer has definitely recommended on the basis of a war time program, there are many other available power developments, some of which have been carefully considered, which have not been thought worthy of recommendation on the basis of war time service. Among these might be mentioned the projects on the Big Bend of the Pit River, of the Pacific Gas and Electric Company, the Fall River Development, between Fall River and Pit River and its tributaries, and also the various smaller projects on the Pit River; the additional developments on the North Fork of the Feather River, owned by the Great Western Power Company, the first project in connection with the Hetch Hetchy water supply, which will take approximately three years to develop, and other smaller developments which can be secured on the Pacific Gas and Electric Company's system, and also the Western States Gas & Electric system in the central part of the state. There are developments contemplated by the Southern California Edison Company and the Southern Sierra Power Company, as well as by the San Joaquin Light and Power Corporation; and the city of Los Angeles contemplates the development of approximately 21,000 kilowatts in connection with their aqueduct. Without considering the latter project, the total additions to the systems which I have mentioned approximate a cost of $50,000,000, and so far as his investigations go the writer is convinced that all of this power can be easily absorbed within two years after development.

An entirely new project which has been carefully investigated, is now known as the Pit River Power Company and is intended to develop water at two locations on the Lower Pit River by the construction of two dams, each giving a first possible development of about 32,000 kilowatts. Favorable recommendation was given to this project as its development could be secured at a reasonably early date.

This power project at 60% load factor will give, with 32,000 kilowatts installed at the lower dam site, approximately 168,000,000 kilowatt hours, and with the two installations will give approximately twice this amount. This power will either have to be delivered to the general network through contractual relationships, or delivered by its own transmission line to the industrial centers between Pit River and San Francisco.

At the present time there exist between the companies in and about the Bay district interconnections so that the companies can exchange power between their systems. As the result of a recent meeting of the engineers of the properties, an additional interconnection was found desirable between the Sierra and San Francisco Power Company and the Pacific Gas and Electric Company near Mission San Jose.

It is also extremely desirable for the companies to arrange for so complete an interconnection of the steam stations, both in San Francisco and Oakland, that there would be need for only one steam station of sufficient capacity to take care of the breakdown service, regulation and the short time peaks on the three interconnected systems. With the present high price of oil and labor the author believes that economies can be secured which would be extremely desirable.

Rules of the Forest Service

The author has made a careful study of the regulations and rules and laws of the Forest Service and the Department of the Interior insofar as they relate to hydro-electric development and control. The opinions in regard to the effect of the present rules and regulations and stipulations differ so widely that it is almost impossible to determine what changes in the present laws, or what recommendations as to alterations in pending legislation, will make for the more rapid development of hydro-electric power. Certainly the main ideas that are undesirable are the revocable permit, the definite franchise stipulation, the matter of just compensation, and the power to be exercised over the complete operations of the company as to conduct and rates. These appear to be the crucial points in all the present legislation and proposed legislation in regard to the power companies. If these can be corrected, the author believes that the financing of the companies and the development of water power can be readily secured.

EXISTING INTERCONNECTIONS

I. In the Bay Region:		
*1.	Pacific Gas and Electric Company and Great Western Power Co. at Oakland	5,000 kw. at 11,000 v. 12,000 kw. at 60,000 v.
2.	Pacific Gas and Electric Company and Sierra and San Francisco Power Company in San Francisco—	
	a. Bay Shore—Martin	10,000 kw. at 11,000 v.
	b. North Beach—Station F	15,000 kw. at 11,000 v.
	c. Martin—Bryant Street taken out	4,000 kw. at 11,000 v.
	d. Martin—Geneva now in Nov. 29, '18	4,000 kw. at 11,000 v.
3.	Great Western Power Company and Sierra and San Francisco Power Company—	
	Tie line connecting steam plants. The last connection is temporarily out of service, due to the absence of switching equipment at the Sierra end. Not now in Nov. 29, 1918.	9,000 kw. at 11,000 v.
II. In Other Parts of Northern and Central California:		
*1.	Pacific Gas and Electric Company and Snow Mountain Water and Power Company at Santa Rosa	6,000 kw. at 60,000 v.
	Nov. 29, 1918, Great Western Power Co. and Snow Mountain Co. at Santa Rosa	(Not stated)
2.	Pacific Gas and Electric Company and Western States Gas and Electric Company at Folsom	3,000 kw. at 60,000 v.
3.	Great Western Power Company and Western States Gas and Electric Company at Folsom	1,000 kw. at 22,000 v.
4.	Sierra and San Francisco Power Company and Western States Gas and Electric Company at Manteca	2,000 kw. at 30,000 v.
*5	Pacific Gas and Electric Company and Western States Gas and Electric Company at Stockton	2,000 kw. at 2,200 v. (Will be increased.)
*6.	Pacific Gas and Electric Company and Northern California Power Company at Chico	10,000 kw. at 60,000 v.
*7.	Northern California Power Company and Western States Gas and Electric Company at Junction City	3,000 kw. at 60,000 v.
*8.	Pacific Gas and Electric Company and Coast Counties Gas and Electric Company at Davenport	2,250 kw. at 24,000 v.
	At Morgan Hill	3,000 kw. at 24,000 v
*9.	Sierra and San Francisco Power Company and Utica Gold Mining Company at Angels Camp	1,000 kw. at 17,000 v.
*10.	There is at the present time under construction between the Sierra and San Francisco Power Company and the Coast Counties Gas and Electric Co. at San Juan	Not yet, Nov. 29, '18 3,000 wk. at 24,000 v.

*These interconnections are in daily service.

New Interconnections

It was the sense of those present that the present plan of the Pacific Gas and Electric Company to temporarily terminate its Wise line at Mission San Jose and step down at that point from 100 to 50 kv. should be completed at as early a date as possible. Then by the construction of a branch 100 kv. line from Mission San Jose to connect with the main line of the Sierra and San Francisco Power Company, distant approximately one mile, a connection will result between the two systems of sufficient capacity to meet all present requirements.

PRESENT AND PROPOSED CAPACITIES OF POWER COMPANIES IN CALIFORNIA

NAME AND LOCATION OF COMPANY	PRESENT HYDRO			PRESENT STEAM			PROPOSED HYDRO	PROPOSED STEAM	COST OF NEW DEVELOPMENT	TIME OF COMPLETION
	Maximum		Mini.	Installed Maximum	Usable	Mini.	Kw.	Kw.	$	
Pacific Gas & Elec. Co., San Francisco	Rated 121600 Heating 122600		LowWater 90000	"A" 49000 "B" 5000 "C" 21000	45000 6500 17000	40000 6500 13500	25000 Bear River	"A" 5138hp. 15000kw. "C" 2468hp. 6000kw.	Boilers $527,000 Hydro $7,200,300	No. 2 Sta., 2½ years. Fordyce, Spaulding, Bowman, 1 to 1½ yrs.
Great West'n Pwr. Co., San Francisco	Rated 65000 Heating 69000		LowWater 69000	S.F. 20000 O. 10500	15000 10500	15000 10500	40000 Feather River	None None	$6,000,000	2 years
Sierra & San Francisco Power Co., San Francisco	Rated 40000 Pen-stock 33000		LowWater 10800	N.B. 27000 Boilers only 10402 h.p.	16000	18000	(9000 Gen. 25000 (9000 Gen. (7000 Gain Stanislaus Rvr.	NB. 2500hp. 9000kw. North Beach Sta.	$2,710,000	1 year 5 yrs. for big dam.
Pit River Power Co., Sheep Rocks							32000 Pit River		$3,000,000 Without transmission line	2½ years
Cal.-Oregon Power Co., San Francisco	Rated 25395 Heating, etc. 19310		LowWater 16200				Proposed dam, etc. 12500 No. 2 Station Pit River		$1,541,000	1½—2 years
TOTAL COST									$20,978,300	
Southern California Edison Co., Los Angeles	116000		87000	106000		77000	113000		$20,000,000	1½—2 years
Southern Sierra Power Co., Riverside, Cal.	85100			8900		?	45600	Cooling Tower	$6,984,000	1—4 years
GRAND TOTAL COST									$47,962,300	
San Joaquin Power Corp., Fresno, Cal. (No data included in proposed installations.)										

FEEDING EUROPE AND OURSELVES

A LETTER TO THE EDITOR FROM THE FOOD ADMINISTRATION

Editor Journal of Electricity:

I am glad to note in your letter of recent date your understanding and appreciation of the problems now confronting the world, especially in the matters which pertain to our phase of the reconstruction work.

When the earthquake visited San Francisco in 1906 and destroyed many lives and millions of dollars' worth of property, the first problem presented was to stop further damage by putting out the fires which raged in many sections of the city. But the problem of feeding and clothing the refugees and the rebuilding of the city of the Golden Gate were far more difficult and complicated than those immediately following the catastrophe.

When German hordes swept into France in 1914, they started a world conflagration. The democracy of the world, in order to prevent the destruction of civilization, banded together to extinguish those flames which were fed by misery, starvation and death. The fire was put out by the formal signing of the armistice on November 11th, but the problems of "revitaillement" and rehabilitation are much greater than those presented by the war itself.

The change in the foreign situation necessarily alters the details of our food program because the freedom of the seas from the submarine menace renders accessible the wheat supplies of India, Australia and the Argentine. The total food demand on the United States is not diminished, however. On the contrary, it is increased. In addition to the supplying of those to whom we are already pledged, we now have the splendid opportunity and obligation of meeting the needs of those millions of people in the hitherto occupied territories who are facing actual starvation.

Our annual pre-war food exports totaled approximately six million tons. Last year we sent 11,000,820 tons of food to Europe. For the present year we will have to export a total of not less than twenty million tons, practically the limit of loading capacity at our ports.

America, by her participation in the war, has accomplished her objectives of self-defense and of vindicating the efficiency of a government in which the people and the people only are sovereign. She has established the foundations of government by the people throughout the enemy countries and this is the real bulwark of world peace. We have yet to build on these foundations. No government or nation can stand if its people are starving. We must do our part if the world be not consumed in the flame of anarchy.

The American people in this most critical period of their history have the opportunity to demonstrate not only their ability to assist in establishing peace on earth but also their consecration by self-denial to the cause of suffering humanity.

Faithfully yours,

U. S. FOOD ADMINISTRATION,
Educational Division,
BEN. S. ALLEN,
Director.

RECLAIMING LANDS FOR THE RETURNED SOLDIER

BY FRANKLIN K. LANE

(The vast scheme of drainage and irrigation planned to care for the employment of returning soldiers is an issue of vital interest to the electrical industry. The labor problem itself is of importance, but in particular these enterprises of reclamation call for electric energy and apparatus in their construction and lay the foundation for new communities with growing electrical demands in their completion. The West has no small share in these plans as is indicated in the following article by the Secretary of the Interior.—The Editor.)

The man who has gone across or is going need not fear for lack of a job at home. Already the Government has plans under way which will insure for every man an opportunity to work at good wages on his return. No one can tell how many of the old places will be ready and waiting for the soldiers and sailors when they have done their bit over there and come home; but no matter how many there may be there is work to be done in the making of America upon which they can be used with profit to themselves and to the country. They have been doing a destructive job, and doing it well, to the pride and glory of our country. When they come back to us they can do a constructive job in the reclaiming of our lands and in the building of homes in the United States for themselves. This is a big job, but a simple job. It is work that must be done some time, and it might as well be done now.

All over the United States there are quantities of lands that are capable of producing cotton, corn, wheat and fruit, which are out of use. Altogether there are perhaps 250,000,000 acres of such lands that in two or three years by scientific drainage or by irrigation or by stumping could be converted into first-class farms.

In the far West, in the arid country along the Colorado river in Arizona, along the Snake in Idaho, the North Platte in Wyoming and Colorado, and near the great rivers of the West, there are millions of acres of lands that can be irrigated, while in the South and in the Northwest there are more than 100,000,000 acres of land that have been logged off but which are lying idle today.

The plan which I have presented to Congress means that we shall put this land to use. That is where the country gains. It means that it shall be put into condition by the soldiers after they have been mustered out. That is where the soldier gains. Every man who has been in the ranks of the army or the navy shall have an opportunity to go on to one of these projects and have a job at the current rate of wages in building a dam or a ditch or leveling land or pulling up stumps, building dikes, clearing land, building houses or roads or fences; and that this shall be done in accordance with the plans which I hope the Government will authorize us to make within the next few months. This means that when the boy reaches New York he goes back home for a time, meets his people, and then is given a chance to take a place in one of the great camps that will be formed for the reclamation of some of this unused land. He gets his wages. Out of these he will pay a certain amount for his board, save enough in a year and a half or two years while he is working to pay a first installment on a farm anywhere—north, south or west, and have that as his own. It will be a farm that will be prepared—not a piece of wild land, but a farm in a settlement which has its roads already built. It will be a farm already surveyed, fenced, a house and barn built, the land cleared, so that a man can move in his furniture and begin life at once. These farms shall be located upon lands which the Department of Agriculture will approve as suitable for raising certain crops. They will be connected with the railroad, if they are not immediately on it, by good roads. They will have centers, little towns already planned with a good schoolhouse up and ready for the teacher. They will be chosen with reference to the marketing of the produce that will be produced upon them, and they will have administrative agents of the Government who will be advisers as to the methods of farming and marketing. In short, each man can have a job, the Government advancing the capital, and out of the combination of his own labor and the Government's capital he can be given an independent living.

But this is not to be done in the slightest bit of charity, nor is any man to be coerced into taking up the work. It is an opportunity which the Government out of appreciation for the fine service rendered by its boys gives to them. They will pay back the money with interest, but they can pay it back over a period of forty years, and no man is to be confined in his choice to the project upon which he works. The man who drains a great area in South Carolina may choose a farm in Arizona or in Idaho. We have spent $50,000,000 a day in fighting the boche, and surely we can afford to spend a few days' war outgo in setting up for life the men who whipped the boche. We are planning the reconstruction of the men who come back sightless, armless, legless. They will be in our continuing care. But the men who come back able for work will not ask or expect that they be given anything more than a fresh chance in the world. And that chance they ought to have.

More than 15 million acres of irrigable land now remain in government hands.

60 million acres of swamp land can be reclaimed and made profitable for agriculture.

This work will give employment to thousands of returned soldiers and will provide farms for them on its completion.

It will mean the building up of this country, the establishment of new communities and a growing demand in the West for electricity and electrical wares.

THE UNIVERSITIES AND THE NEW WORLD

BY GEO. F. SWAIN

(Our Universities are educating a good share of our next business generation and it behooves every man to see that they are accomplishing the desired results. The war has brought new vision and the schools and Universities must be readjusted to meet the opportunity. Some of the concrete possibilities of the college in the new era are here reviewed. The author is professor of civil engineering at the Massachusetts Institute of Technology and a past president of the A. S. C. E. He is a Western man and was the Hitchcock speaker at the semi-centenary celebration of the University of California last year.—The Editor.)

Now that the war has been brought to a triumphant close by the overwhelming defeat of the most arrogant and brutal autocracy the world has ever known, it behooves us all to consider seriously the problems of reconstruction which we face. The world will never be the same again. All branches of human activity will feel its effect. Cobwebs have been swept away from men's minds. We have learned that many things which would have been pronounced impossible are not only possible but have been accomplished because they had to be done.

In education, as in other things, there will be changes and improvements. I have long believed that no field of human activity had a smaller percentage of efficiency than education, and the problem before educators will be—unless they disagree and think that we were already efficient—how to improve its efficiency.

The Need of a Motive —

One of the great sources of inefficiency has been lack of motive and interest based upon experience. I maintain that no one is able to assimilate properly a subject which he is studying unless he can relate it to his experience. If he cannot do this the subject will remain vague and abstract in his mind, and he will take little real interest in it; or else, if he does take an interest in it, it will be because he relates it not to his experience but to his imagination, and relies upon preconceived ideas, sentiment or sympathy instead of facts. If a subject is taught in such a way that the student can see its bearing upon his daily life, its value to him, he will study it with interest and understanding, and only then. I believe that most of the difficulty with education arises from a lack of appreciation of this fact.

Consider the subject of Mathematics, for instance. Arithmetic appeals to the experience of every one, for every boy keeps or should keep a cash account and makes change every day. The higher branches of mathematics, however, do not in general appeal to experience, and are frequently taught in a very abstract manner. Probably that is the reason why so many boys hate the subject, and why so many others who think they like it do not really understand it or gain from it much power to apply it. If taught as a tool in connection with its application, and with illustrations drawn from practice and not from fancy, the result would be much better.

History and literature, if treated in the abstract, do little to inculcate real culture, but if taught to show the relation of cause and effect, to acquaint the student with the thoughts and characters of the great men of the past, to show great tendencies of society and not simply the doings of kings, they may be made most interesting and profitable.

Improvements Possible —

The subject of Economics, now carried to such excess in some of our colleges, is a good illustration of the necessity of relating a subject to experience if really good results are to be attained. Here is a subject which deals primarily with great business problems of the highest importance. The young men who study this subject, however, have had no business experience and cannot relate the subject to their experience. They think they are interested in it, because it deals with subjects which they hear so much about, but as a matter of fact they relate the subject not to their experience but to their imagination or their sentiment, and many of them go out of college with vague, erroneous and even ridiculous ideas.

A student finds, for instance, that his professor holds views which are diametrically opposed to the views of another professor equally eminent in a neighboring college, while neither can prove his views correct. The student is therefore naturally under the temptation to rely upon his own preconceived or inherited ideas, and to be governed by these and by sentiment rather than by reason, and to think that his own ideas are as good as anybody else's, because nobody can absolutely disprove them, and because he can find abundant support for them no matter what they may be. If the subject of Economics were taught as many friends of mine teach it, it might be very beneficial, giving the student sane and sound ideas in showing him the fallacies of many current economic notions. But even then he would run the risk of having his equilibrium disturbed by finding that the views of his professor were widely disputed.

Some branches of economics may be related to experience, such for instance as bookkeeping and accounting, fundamental notions with reference to the promotion and organization of an enterprise, various forms of securities, the functions of a bank and what it will do and how it can be used by a young man, and the elementary principles of business law. I know from experience that these subjects can be grasped and appreciated by a student, while subjects such as railroad fares, labor problems, the tariff and many others are quite beyond anything but his imagination.

Impetus to Engineering Study —

The war has been a war of engineering, and has been won by the use of engineering appliances and methods. The aeroplane, the tank, the submarine, wireless telegraphy, and all such applications of science have played the principal part, aside from the human energy which has directed their application. The thoughts of our young men are directed as they

never have been before toward engineering in its various branches. I believe, therefore, that the effect of the war will be to give a great impetus to engineering education, and that our engineering schools will be sought by multitudes of young men who will prefer the practical and definite education which it affords to the more vague, uncertain and less immediately useful opportunities offered by a college course. In all of our schools, however, I think more attention will be paid to making the courses practical, immediately useful, and related to the experience of the student. The great motto will be to motivate the work, that is, to make the student see its bearing and its immediate value, so that he will study it with greater interest and from the concrete point of view rather than the abstract. Efficiency must be introduced into our schools. Even courses in general subjects like English and Economics should be, and, I believe, will be taught in a manner different from that heretofore pursued, by making them more fundamental, confining them to subjects related to the student's experience, and omitting those which are not so related; in other words, by motivating them.

Clearing the Curricula —

Every college student knows that there are many courses given which are practically useless. We have crowded our curricula with every conceivable subject of human interest regardless of whether the student could relate them to his experience. We have confused putting a subject into the curriculum with putting it into the student. We have confused research with discipline. Research has no place in an undergraduate course, and very little in any academic course. The students are not sufficiently trained to be able to make researches in the proper sense of the work. Researches should be conducted by trained men after they have graduated, in special institutions or special branches of our colleges.

In connection with college work the great aim should be to make the student think. Most students, and most men and women do not really think. They are easily led astray and made to believe whatever seems plausible, and they like to be deceived by others and by themselves. They would rather face pleasant falsehoods than unpleasant truths. The scientific attitude of mind, which leads a man to come to no conclusions until he has first gathered the facts, made experiments if necessary, and carefully considered the subject in all its bearings, is comparatively rare. Impracticable ideals are pursued, and social and economic schemes are proposed with the purpose of remedying some defect, without realizing that the proposed scheme, while it may remedy that defect, will substitute others which are worse.

Safeguarding Democracy —

At the present time nothing is more important than clear thinking. The war will result in a great increase or flood of democracy all over the world, and, now that autocracy has been defeated, the tendency will be for us to think that our troubles are at an end. History teaches, however, that democracy is not inherently superior to autocracy. It depends upon the kind of democracy and the kind of autocracy. Liberty may exist under an autocracy and not under a democracy, and the two watch words of democracy, namely, liberty and equality, are mutually exclusive. Where there is liberty there cannot be equality, and where there is equality there cannot be liberty. Tyranny may exist in an autocracy or in a democracy, and the tyranny of the many may be worse than the tyranny of the few, because responsibility is less concentrated and there is less dependence upon individual conscience.

Autocracy has been overthrown in Russia. Is the democracy which has succeeded it any better? Not so far, though we hope that it will be in the future. Autocracy was overthrown by the French Revolution, but in the popular rule which followed it crimes were committed and liberty infringed to as great an extent, if not greater, than exhibited by the Germans in the recent war. Probably the happiest periods in the world's history have been under autocratic government.

Liberty and Government Ownership —

We are apt in a democracy to think that we govern ourselves. As a matter of fact, under any government we are governed, perhaps by one man, perhaps by a few, perhaps nominally by a majority of voters, but in any case really by a few. Democracies have existed in the past, as advanced in civilization, except in material things and the application of science, as our own, and they have crumbled into dust and have been succeeded by autocracy. We must not deceive ourselves by thinking that the same thing may not happen again or to us. It was a wise statesman who said that eternal vigilance was the price of liberty. Liberty does not consist of the privilege of going to the polls once a year and voting. Liberty exists when all men are equal before the law; when the administration of justice is impartial; when the individual man is free to do as he pleases so long as he does not injure others, and is punished when he does injure others; if he is protected in the possession of all property that he can legally acquire, encouraged to develop his powers to the utmost, and assured of the possibility of rising to any position commensurate with his ability and character.

If the private property of individuals is taken by the state against the wishes of the owner and without public necessity, for taxes, or these are assessed upon one class for the support of another class; if one class are dependent upon the government and another class pays the taxes, liberty does not exist, initiative will be stifled, and prosperity will depart. This is the tendency of public ownership, which means management by politicians.

Education the Hope —

There are tendencies in this country today in these directions, and many of our most capable, thrifty and thoughtful citizens are profoundly discouraged with the outlook. Whether their fears are justified the future will show. The American people are better fitted than any people that the world has ever seen for self government, and, while they have made mistakes, they have generally corrected

them before it was too late. It does not follow, however, that they will always do so, and it behooves us at this time more than ever before, when the flood of democracy has been loosed and when, as I have said, there is a tendency to consider our problems as solved and our liberties as safe, to take thought of the future, to recognize our dangers, and not to allow ourselves to be deceived by the demagogue, by the one who poses as the friend of the people, or to be misled by fine phrases and moral sentiments. That our people may be educated to a true and sane view of things, and that the destruction of autocracy may not be succeeded by a democracy which will be worse, must be the earnest prayer of every good American; but it seems inevitable that in many countries there will be a period of great disturbance before a state of equilibrium is reached.

TRANSPORTATION AND WESTERN POWER PROBLEMS

BY JOHN H. LEWIS

(A suggestion from a Western engineer of what might be done by railway electrification and the development of our navigable streams and their latent water power which opens vast possibilities. The paper of which an abstract is here given was taken up before the Utah Society of Engineers and local section of A. I. E. E. by the author, who until recently was State Engineer of Oregon.—The Editor.)

The development of the West, with its peculiarities of climate, topography and natural resources, is primarily dependent upon transportation and market facilities.

Our population is limited. There is thus no demand for agricultural or industrial development in excess of local needs, unless rail and water rates are such as will permit profitable shipment to other markets. The loss of potatoes in Idaho, apples in Oregon, and other produce from the West during the past year, through lack of cars, will discourage production, unless some relief is assured. This can only come through improvements in rail and water transportation facilities, now under national control. We should, therefore, see to it that any changes which are made in our national transportation policies will fit our local conditions and needs.

The recent coal famine has brought forcibly to our attention the need for some reform in transportation policies. Prior to the Federal Government's taking over the railroads, it is claimed, extensions and improvements in service were not made, because of the unwillingness of our public officials to permit the average road to earn reasonable returns on the capital invested, lest the more favored roads earn unreasonably large profits. Now there is danger that the private owners will not plan necessary extensions and improvements because of the uncertainty as to whether or not the roads are to be returned after the war. There is also danger that the Federal Government will not be prepared to make these improvements, in case the people demand that ownership be retained in the Federal Government.

Revolutionary changes are taking place in England, to work out certain national economies. Recently, the British Ministry of Reconstruction approved a scheme for supplying cheap electrical power to all industries in Great Britain from 15 "superpower stations." It is estimated this change will save $500,000,000 annually. While conditions in this country are not comparable to those in England, and such a plan doubtless would not be feasible except in limited areas, yet there are other fields in which great reforms can be worked. Some of these are believed to be beyond the reach of private capital, and it appears necessary that Federal aid should be had. It is not urged that the Federal Government enter any field now adequately served by private capital, or which is within reach of private capital in the near future, but rather to do those things which private capital cannot do, in order to open new fields for both capital and labor.

Railroad Electrification

An analysis of our coal situation will show that the recent coal famine would have been averted, had our important railway systems been electrically operated.

We are now using more cars to haul coal than any other class of railroad freight, according to the best information available. Coal constitutes approximately 25 per cent of all freight carried, employing 900,000 cars, which carry more than 42,000,000 tons at one loading. Even in the eastern part of the country, where the haul from mine to factory is short, it is said to constitute 33 per cent of the total tonnage.

Several leading authorities agree that approximately one-fourth of all the coal mined in the United States is used for running the railroads. This amounts to 150,000,000 tons for 1917. It is burned under such inefficient conditions that 6 lb. of coal is required to produce one horsepower hour. The same coal in steam turbines would produce three times the amount of power in the motors of an electric locomotive, according to Mr. Rice, president of the American Institute of Electrical Engineers. One-third of this coal, or 100,000,000 tons, could thus have been saved in 1917, if the roads had been electrified. This is more than three times the total coal exports for that year. Such a saving would easily have averted our disastrous coal famine.

Where electricity has been substituted for steam, in the operation of railroads, fully 50 per cent increase in available capacity of existing tracks and other facilities has been demonstrated, according to the same authority.

The best results from electrification can be had only on railroad systems, where there is a heavy and continuous freight and passenger traffic, and especially in the western mountainous country, where the grades are steep and continuous.

The Butte, Anaconda and Pacific Railway and the Chicago, Milwaukee & Puget Sound Railroad,

both electrically operated, are examples of the latter class.

Most of the roads in this western mountainous region are single track. Some of these are nearing their traffic capacity and are considering double tracking. The cost of doubling the capacity of the single track, through electrification, is less than one-half the cost of additional track for steam operation, according to an eminent authority.

Water power is abundant in the West, and the arguments for electrification are well known and appreciated. But owing to the difficulty of enlisting new capital in the past, or for other reasons, these reforms have not been undertaken.

The production of electric power from steam turbines utilizing coal burned at the mine, where water power is not available, would doubtless prove economical on many roads in the East. In these districts great quantities of coal are also consumed by small, inefficient plants in the production of power for industrial purposes. Authorities state, during the last ten years, the cost of coal has risen on an average of one per cent per year, while the cost of electric power produced from coal in large plants has fallen on an average of 2½ per cent per year. The adoption of more efficient methods of power production will eventually be forced by this increasing cost of coal.

A careful study of all facts bearing on this subject will doubtless show that in certain sections, at least, it will be found advisable to institute some of these reforms in the near future. The doing of this will provide work for our returning soldiers and discharged munition workers, and will go far towards meeting industrial competition from England and other countries.

Navigation Policy

To relieve the congestion of our railroads water transportation should be fostered and encouraged by the Federal Government.

With a general policy of railway electrification decided upon, the question of canalizing our rivers so as to make deep slack water pools, through the building of dams, is thus greatly simplified, for a market would at once be available for much of the power created by such dams.

In addition to this possible market for such by-product from a proper navigation policy, there are many new electrolytic and electric furnace industries which require large quantities of cheap power for successful operation. These should afford a profitable market for much of the surplus power that would be developed incident to navigation.

Conditions in the West

Conditions in the West, and particularly in the Columbia River basin, are different from those in most other sections of the United States. Here we have enormously undeveloped resources, in a great area with limited population. With the development of inland water transportation and corresponding reduction of railway freight, we have an opportunity to develop great industries at the point where these inland rail and water transportation lines meet ocean transportation facilities. These are the conditions which have led to such a rapid development of the water powers of Norway. Any resources which are lacking can be had at this point as return ship cargoes from foreign countries. The recent completion of the government railway to the coal mines of Alaska, and opening of the Panama Canal, lend hope that this development will occur as soon as we have solved our inland navigation problem.

The presence of great undeveloped water power resources is one of the important points in which the West differs from other sections. Here we have over one-half of all the water power in the United States in small area west of the Rocky Mountains, according to U. S. Geological Survey reports.

The Columbia River is second only to the Mississippi River, when we consider navigable inland waters of North America. It differs from the Mississippi however in this important particular: The distance from the continental divide down the Snake River to the Pacific ocean is only about one-third the distance down the Yellowstone and Missouri rivers to the Gulf of Mexico. This accounts for the fact that there is more water power available in the Columbia River basin than in any other similar area in the United States.

The Columbia River is therefore of more value for water power purposes than the Mississippi, but of less value for navigation without extensive improvements. The stream is now navigable for only high power, swift water boats, and not navigable except in isolated sections for small boats towing great fleets of loaded barges as on the Mississippi River.

Experts agree there is no possibility that future water traffic will ever justify the building of dams to aid navigation under the present policy of direct appropriations unless we can find some use for the water power thus created. Any policy which will ultimately make this river navigable for heavily loaded barges should be of particular interest to the great inter-mountain country, as it will compel a material reduction in railroad freight charges and thus promote development of many industries, which would not otherwise be commercially feasible.

These navigation dams should be built only as fast as a profitable market can be found for the water power developed incidentally thereto. The firm dam in the Columbia River should be built at the foot of the first rapids, near Bonneville, 42 miles above Portland, the metropolis of Oregon, and 143 miles from the Pacific ocean. Here a head of 44 feet would develop 200,000 continuous horsepower, and an equal amount of part time power. This dam would drown out five miles of swift water immediately above, through which all river boats must now pass to the entrance of Cascade Lock. The slack water pool created by this dam would extend up-stream 45 miles to the next obstruction, which is above The Dalles, or 190 miles from the mouth of the river. Here a 105-ft. head can be secured with the development of 480,000 primary and 320,000 secondary horsepower. This project would in turn create a slack water pool extending 30 miles farther up-stream. In the vicinity of this point 500,000 additional horsepower could be developed by private capital in small plants along the Deschutes River, if a profitable market for such power could be found.

A NATIONAL DEPARTMENT OF PUBLIC WORKS

BY C. E. GRUNSKY

(So much of the reconstruction work planned for the immediate future is engineering in its character that the question of the establishment of a department of public works to be represented in the President's cabinet is one of much timely interest. Engineering work at present is carried out under five different departments with as many special bureaus and commissions. Undoubtedly much could be gained in efficiency and effectiveness by a reorganization as suggested below. The author is a well-known engineer of San Francisco who himself has done much engineering work for the government, both on the Panama Canal and later as consulting engineer for the Department of the Interior on the Reclamation Service.—The Editor.)

A Time for Readjustment —

Every branch of the engineering profession should exert its influence in shaping the readjustment to peace conditions. Would it not, therefore, be timely to again give serious consideration to the establishment of a Department of Public Works? Let us look back for a moment to the situation before the resources of the nation were pledged to the winning of the war. A bureau system had grown up, which has its advantages but which can perhaps be replaced, along certain lines at least, by something better. In the matter of public works let this be briefly considered.

The Growth of the Present System —

Some 30 to 40 years ago the U. S. Geological Survey, a bureau in the Department of the Interior, under the able and far-sighted leadership of Major J. W. Powell, undertook the work of stream gaging. Small appropriations were made from time to time by Congress for this work and more or less fun was poked at the geologist for including the determination of available water among the studies supposed to relate more particularly to the mineral resources of the country. A little later the Geological Survey sought the cooperation of the individual states in this study of water resources and thereafter did the most work in those states which, recognizing the importance thereof, would contribute to its cost. The data collected and published by the Survey, largely under this system of cooperation, have proved invaluable to the engineer who is now fairly well informed on probabilities of stream flow and can make, with more or less allowance for departure from probabilities, the necessary deduction relating to the extremes of flow. A very valuable work has thus been done by a bureau operating somewhat beyond its natural sphere and this work is being continued and deserves approval. The engineers of today are thankful that it was commenced long ago and those of the future will feel grateful for its uninterrupted continuance and extension.

Many Departments Represented —

When this country entered upon a program of federal aid to irrigation enterprises involving examinations and field studies, reports, plans, cost estimates and construction, there was no department to which such works would naturally fall. A new bureau was created, the U. S. Reclamation Service, first considered as an offshoot of the U. S. Geological Survey and placed under the Director of the Survey, but now independent of the Survey and directly under the Secretary of the Interior. The staff of this new bureau was largely recruited from the engineers who were already in the employ of the Survey.

About the same time plans were made for the handling of construction work at Panama. Commission after Commission had theretofore been appointed to give consideration to the best location for a canal. The question now arose who should take charge of construction. As there was no appropriate department a Commission was authorized and an independent organization was established that did not fit in anywhere. But, it was convenient to have the same attached to one of the executive departments and the President directed that it should act under and report through the Secretary of War.

The river and harbor work of the country has long been in charge of the engineers trained at West Point. In times of peace these engineers, under the Secretary of War, are assigned to various stations throughout the country and have charge of all problems relating to the betterment of river navigation, canal construction and harbor improvements. In this body of engineers and their system of organization, it seems probable that the best nucleus of a Department of Public Works will be found.

The coast and geodetic surveys are directed and conducted by a bureau under the Secretary of Commerce. The Department of Agriculture has long been hoping for a bureau of construction to undertake the reclamation of swamp and overflowed lands of the country, in the same way, and with the same liberal aid as was accorded by congress to the reclamation of arid and semi arid lands.

The planning and erection of public buildings is in charge of a bureau of architecture under the Secretary of the Treasury.

A Department of Public Works —

Whenever a suggestion is made that all of the bureaus concerned in any way with affairs related to public works, such as above enumerated, be combined in one department, the opposition of these bureaus becomes vigorous. The claim is made that each thereof, working independently, can accomplish more and do its work better than if working under one head, in cooperation with the others. We have been getting along under the established system, why experiment with a new one? The establishment of a Department of Public Works would mean the association with the Engineer Corps of the United States army a host of civil engineers, who would necessarily be given the same rank and standing as the army engineers—an idea which is more or less repugnant to the man whose principal training has

been along military lines. And so, though often suggested, nothing has come of past attempts to have a Department of Public Works created with a member of the Cabinet at its head. Nevertheless, the country needs such a Department. There is more public work now to be done than ever before in the history of the country. Thus, for example, the United States should be committed alone or in cooperation with the several states to the construction of storage reservoirs. From such reservoirs under federal or state control the needs of irrigators can be met; water can be furnished to municipalities and for power; navigation can be benefited and in some measure, too, the flood menace on many streams can be reduced. The projects of this kind to be first constructed would naturally be those which offer the best prospect of an early return of operating expenses. Who, then, shall determine the question of physical and economical feasibility? Possibly the United States Reclamation Service—better a federal Department of Public Works. Or, as another illustration, we are told that there are some 60,000,000 to 80,000,000 acres of swamp and overflowed land which can be made available for cultivation by suitable drainage and protection works. Who shall determine the feasibility? The Department of Agriculture through a swamp-land reclamation bureau? Or, why not again, a Department of Public Works?

Such a department is a logical feature of such a government as that of the United States; it would be regarded as a necessity if we were starting anew; its organization at this time would be timely. Why not consolidate some of the duties of the other cabinet members and make room for a Secretary of Public Works? Why not use the Engineer Corps of the U. S. Army on the engineering staff of such a Department? Why not let every graduate of an accredited engineering college have the right to become a member of this engineering staff with equal rank and standing as the West Point graduate? Why not do it now in this time of readjustment to peace conditions?

MEETING THE IMMEDIATE PROBLEMS IN THE WEST

BY A. G. WISHON

(A view of some of the more personal problems which confront the business of the West, always with a background of national and international adjustments—by the general manager of the San Joaquin Light & Power Corporation.—The Editor.)

The war is over. And what next? That is the big question before us today. Before going to Europe President Wilson said, significantly, that a peace must be made to insure the freedom of the peoples of the world, and not for the selfish advantage of a solitary nation. It will be a peace to enlighten the down-trodden individual, a peace whereby the fortunate will come to the aid of the unfortunate, a peace that will make this world a better place in which to live. What this means is not appreciable generally to the populace of the United States. Only those who have come from Europe or have visited there and studied the economic conditions of the separate nations can fully understand the stupendous problems that are to result from the sudden liberation of millions and millions of people who, until this time, in the category of European castes have been distinguished only as the masses, or the serfs, or the "common people." Their transmigration from a state of bondage to one of freedom is now being attended with revolutions and upheavals; what is yet to come can only be guessed at. And it remains for a sane, level headed, clear thinking, liberty loving and experienced people like those of the United States to hold the balance—to bring order out of chaos.

However foreign this may seem to us, nevertheless it is an integral part of our existence. The troubles of Europe are our troubles. We have been of service to mankind through our war efforts and even though the war is now behind us, we are in reality only getting up steam for the performance of our duty to a suffering world. Upon the United States rests the responsibility of rehabilitating a stricken people. It is up to us to roll up our sleeves and make the dirt fly. We want to look our problems squarely in the face, get them out of the way and perform the task before us with the greatest efficiency for all parties concerned.

We have of necessity to care for our own people. To keep them in such fitness of body and mind that they can keep abreast in this terrific race now on, is the problem and responsibility of the government and every employer. Work, work and still more work amid satisfying surroundings is the answer. The sooner we get our big work started and business again under way in every line of endeavor, the better it will be for us all. There will be work enough for everybody and I believe that if we only put our minds to it and use our pencil, we can figure out a method that will make everyone satisfied and everyone determined to put forth his best efforts.

My thought is, to make every one of your employes interested in your business. How this can best be accomplished is for you to decide. Some of us can best give annual bonuses; others endowments; others pensions for long service; others sick or death benefits, and still others an actual monetary interest in the business, permitting the enjoyment of dividend earnings and other advantages in addition to the usual wages for service rendered. This is certain to be the solution of many economic problems. To me the plan of every employe a partner appears to be the ideal plan. By it you will have the three vital factors of your business tied in together: the stockholder, the organization and the public you serve.

The biggest problem now before the country is that of the resumption of development and of business in every line of endeavor. The labor situation vitally depends on such resumption, and otherwise there is need of the production itself to supply the demand at home and abroad. We shall get back to a normal basis quickest by such development and both capital and labor will be best served thereby. But in getting back to this basis let us lose sight of all selfish motives and shape our plans for the future welfare and betterment of the condition of those whom it is our duty and privilege to serve.

AMERICA AND RECONSTRUCTION IN EUROPE

(The rebuilding of cities and industries entirely destroyed, as there are so many in Belgium and northern France, means electrical construction on a wholesale scale and with possibilities of uniformity and foresighted planning which present a fascinating problem. Not only will American industry and American engineers have a part in this work but the rehabilitation of science and industry in these countries brings forward much which may serve as an example in our own problems of readjustment.—The Editor.)

ELECTRICITY A FACTOR IN RECONSTRUCTION IN FRANCE

The reconstitution of economic life in the invaded regions of France will not be possible without having recourse as largely as possible to electricity. The directors and representatives of the large central power stations and electric-lighting plants situated in the invaded regions are already engaged in studying the problem of reconstructing their central power stations. They have already marked out the broad outlines of their plan, as follows:

Probable Extent of Destruction and Plans for Restoration

Those interested, as a technical committee, have been brought together. The data in the possession of this committee indicate that the power stations existing in the regions occupied by the enemy represented electrical energy, including units in process of installation, that did not fall far short of 300,000 kilowatts. From the information gathered by the committee, it is only too evident that in the immense majority of cases the electrical machinery, boilers, transmission lines, and in many cases the buildings themselves have been destroyed. It seems prudent, therefore, to face the necessity for replacing practically the whole electric-generating installation in the invaded regions. However, in order to avoid, on the one hand, undertaking a program which would be too ambitious and which would attempt to reestablish at one stroke the electrical situation as it existed before the war, while, as a matter of fact, the reconstruction of the invaded regions will without doubt demand several years, and to avoid, on the other hand, adopting a program so restricted as to cause cruel disappointments to those interested, the electrical committee has agreed to limit its plans—for the time being at least—to the restoration of one-third of the energy of the period before the war. This involves the restoration of 100,000 kilowatts.

Standardized Equipment Favored

Those interested are agreed that since they will undoubtedly find themselves face to face with a clean slate so far as the old plants are concerned, advantage should be taken of the opportunity for securing as largely as possible the standardization of new equipment and transmission systems. The adoption of the principle of standardization would make it possible for those interested to help one another most effectively because the machinery available would be capable of being used in one place as well as another and could be transported from point to point. The adoption of this principle of standardization would also permit the manufacture of the electrical equipment in series, which would naturally result in lowering the net selling price. It is true this process of standardization would impose sacrifices on certain of the electrical societies interested, but nevertheless they have not hesitated, in the interest of the invaded regions as a whole, to adopt a single type of generating apparatus. It will be a turbo-alternator group of 5,000 kilowatts supplying three-phase current at 50 cycles per second at 10,500 volts.

In order to develop as quickly as possible the desired energy of 100,000 kilowatts it would be necessary to provide for the installation of 20 identical sets, such as were mentioned, each one equipped with its own boiler plant, switchboards and distribution lines, with the necessary transformers and distributing apparatus.

Location of Generating Sets

An important question is, Where would these new generating units be installed? The object in view being to furnish electric current in the invaded regions as speedily as any part of them has been liberated, it seems obvious that the first equipment would have to be installed in temporary central stations. These temporary stations would in some cases be designed to reinforce central stations already in operation on this side of the firing line. A part of the new installation would perhaps be left in reserve in order to be ready for installation in strategic locations in the regions still occupied by the enemy the moment their liberation has been brought about. These locations, naturally, can not be fixed definitely at this moment; they depend upon future events.

Methods of Distribution

Another question to be answered is, How will the electric current be distributed? Will it be by the existing transmission systems that may eventually be recovered? The object, of course, will be to satisfy the collective needs of the liberated regions as effectively as possible. In spite of the uncertainty with regard to the conditions in which the liberation of the invaded territory will be brought about, it is absolutely necessary to provide for the most effective distribution of current, no matter what locations may be chosen for the generation of the current. In this connection the electrical committee thinks it much better to leave out of consideration the old transmission lines, for the chances are that all the copper wire has been either destroyed or carried off by the enemy. Moreover, even if part of the old transmission system should be found intact, it would probably not be capable of use. For one thing, the old lines were arranged for supplying local communities and were not designed with the object of tying up in one system the various zones requiring electric current on the basis of the proposed new central stations. Undoubtedly the old transmission lines would not be of much use in meeting the need of the future. It is wiser, therefore, not to place any reliance upon their utilization. On the other hand, the new lines that must be constructed in order to assure

the proper distribution of current can not be determined without taking into account the distribution of current before the war.

To aid in solving this particular problem there has already been worked out a map showing the distribution lines existing in 1914. In addition a new map has been prepared, indicating in a general way the transmission lines that will be necessary for the distribution of energy in the invaded regions after the war. The provisional and theoretical transmission lines that have thus been sketched out have been developed purely from the point of view of the general public interest. No account has been taken of the more restricted interests of electric companies themselves and their individual consumers. The transmission lines contemplated by the committee have been classified in various categories according to the urgency of their installation.

Efficiency From Large-Scale System—Government Aid

By the creation of a vast system of power generation and distribution established in accordance with a general plan carefully laid out and capable of realization by successive stages as the needs of the invaded regions may dictate, the committee hopes to achieve the maximum efficiency by avoiding the creation of numerous small private central stations, which are for the most part not economically efficient. Moreover, the scientific use of fuel in the projected large central stations will prevent the waste of coal that it is impossible to eliminate in small installations.

Needless to say, in realizing this plan the support of the French Government, as well as of private parties, is absolutely necessary. It is desirable for all those interested, including manufacturers, farmers, municipalities and villages, public institutions, etc., and the public generally to be familiar with the program in course of elaboration, so that they may be in a position to share in the benefits of the work that is being carried on.

RECONSTRUCTION MEASURES IN GREAT BRITAIN

Ministry of Reconstruction

The far-seeing statesmen of England early perceived the necessity for thorough after-the-war planning. To that end, under the ministry of reconstruction, eighty-seven committees were appointed over two years ago to investigate and report upon after-the-war problems, with appropriate recommendations; in other words, to suggest the most practical means of safeguarding and promoting the welfare of the nation.

The duties and scope of each committee were definitely outlined. These eighty-seven committees were grouped into fifteen divisions, covering the whole economic field of reconstruction. The leading position was given to trade development. All of these committees have doubtless made their reports, and in some cases appropriate governmental action has already been taken.

Against State Control

There is voiced by the Committee on Commercial and Industrial Policy an acknowledgment and approval of the widespread demand that measures of government control should be removed as fast as possible, and a basis of individual competition again established not only at home, but in foreign markets also.

Other recommendations which are of interest to the United States, because we are confronted with the same problems, are:

1. Fostering of key industries, such as dyestuffs, for instance, at any expense either by loans, subsidy tariff or government contracts.
2. Anti-dumping laws.
3. No special commercial treaties with Allies or neutrals in order to secure reciprocal concessions.

Conclusion

In general England is rapidly learning the lesson of cooperation without paternalism that leaves open the stimulant of individual competition. Her efforts are directed especially to the promotion of trade with and between the dominions overseas. She is specializing and organizing to bring the foreign buyer and the domestic manufacturer together. She has sent trade emissaries to build up trade good-will abroad in every country of importance, and while discriminating, perhaps, insofar as imperial trade arrangements are concerned, is thoroughly organizing to go after trade without pursuing any policy of unfair advantage. Essential to her in ordinary times, the securing of a large share of the world's trade is now nothing short of vital to her in the strenuous task of restoring the economic ravages of war.

POST-WAR PREPARATION IN SPAIN

A committee of the Spanish civil engineers has requested the Spanish Government to make an appropriation for a technical engineering exposition in order to prepare Spanish engineers to compete efficiently with post-war conditions. As a consequence the Spanish Institute of Civil Engineers has now been accorded the right to convene a Spanish congress of civil engineers in Madrid in the spring of 1919. In a circular issued by the institute it is stated that the object of the congress will be the organization of Spanish civil engineers for their mutual benefit and the development of their resources to enable them to compete efficaciously in large enterprises that will be undertaken after the war. A study will be made of Spanish production in its relation to other countries, and the growing exigencies of domestic consumption, so that if in the future another crisis like that of the present should arise, the country will be in a position to provide for itself. The congress will devote its attention to 12 sections, as follows:

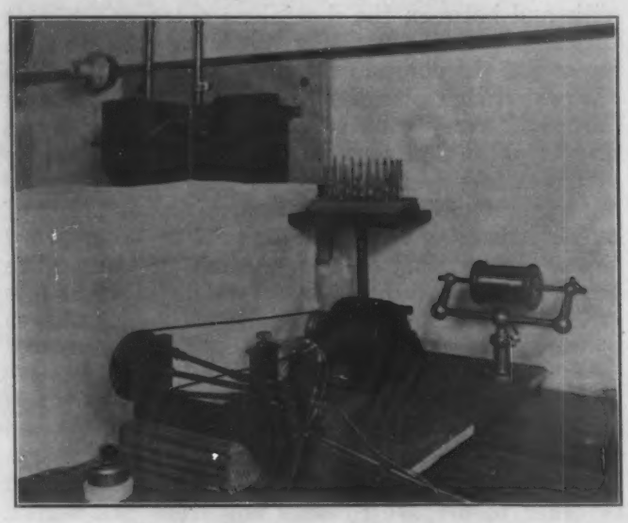
1. Public works and transportation.
2. Naval construction.
3. Mechanics, motors, and machinery.
4. Mines and metallurgy.
5. Physical and chemical industries.
6. Electrotechnics.
7. Agricultural industries and their derivatives.
8. Forest industries and their derivatives.
9. Application of domestic industries to the needs of the war.
10. Elementary and superior technical instruction.
11. Organization of labor, of hygiene, and of social questions.
12. Industrial economy and legislation.

THE DEVELOPMENT OF THE VACUUM VALVE

(The vacuum valve not only is the factor which has made possible the wireless telephone used on aeroplanes, of which so much has recently been said, but it is also associated with many other modern developments in wireless telephony and telegraphy. A San Francisco man, O. B. Moorhead, is inventor of this remarkable device and its manufacture is carried on in the San Francisco factory here described, under the supervision of Captain R. W. A. Brewer of the British army, who has taken an important part in its development.—The Editor.)

The Importance of the Valve —

The device which is the subject of this article is very little known outside the sphere of those who are intimately associated with the modern developments of wireless telegraphy and telephony. The valve, however, has achieved such remarkable performances in the last few years, that it may be considered to be one of the most important devices in the wireless world and it has undoubtedly been an important factor in perfecting the means of signaling in the European armies and navies. The type of valve in general use performs many functions, acting as a detector, oscillator, rectifier, amplifier or transmitter as the case may be, according to how it is connected up in the electrical circuit.



Three-spindle rolling mill for forming grids

A valve is so termed because it acts as a rectifier for alternating waves, and it takes the place of the crystal when employed for this purpose, and for the following reason: The three element valve emits electrons from the heated filament to the anode and allows current to pass only in one direction from the anode, on which a positive charge is impressed, to the heated cathode.

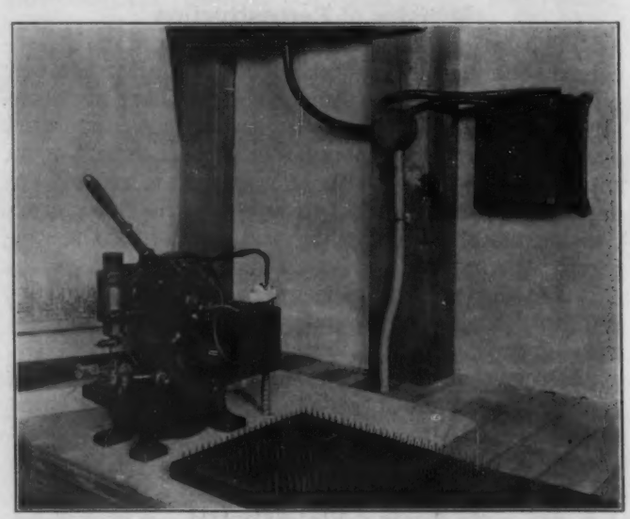
It will thus be seen that only the positive portions of the alternating wave which is connected with the anode can pass to the cathode. Between the anode and the cathode a third element termed the grid is interposed, having a single terminal to which is connected one terminal of the outside circuit which is to be amplified or detected. This may be coupled up through the medium of a loose coupled coil and a condenser so that the radio waves impress varying potentials upon the grid. When the valve acts as an amplifier the plate current passing from the anode to the cathode is intercepted by the grid and influenced by the varying potential thereon and the slight variations in grid potential react on the plate current which latter is connected through the telephone receiver producing audible signals.

Combined shearing and forming machine for support wires. The element is now lying on the shears, the cam shaped former for the hook is in the foreground and the finished wire element is shown resting on base of the machine.

In Wireless Telephony —

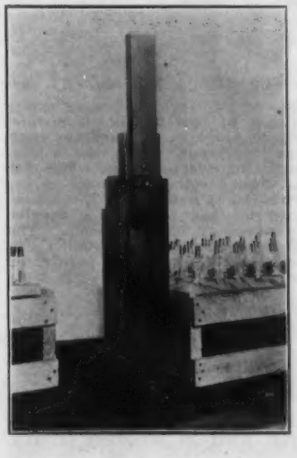
In wireless telephony one of these valves can be used as an oscillator producing a wave of radio frequency which acts as the medium for carrying the wave of audio frequency set up in another valve by means of a microphone transmitter, and at the receiving station the message is amplified by means of one or more valves in series according to the strength of the incoming signal.

Amplifying can be carried out to any desired degree, giving results which are perfectly true reproductions and free from those objections inherent



A spot welder for fixing grids—shown with grid in position—which gives a delicate location for welds. The plate welding machine has a different set of tools and mandrels but is otherwise similar.

with the use of metallic devices and conductors. Signals have been picked up in the war zone by means of wire loops laid on the surface of the ground and have been transmitted over long distances by radio phone and to and from aeroplanes in flight, the



Drop-hammer with trigger shown ready for action and element in position at base of machine. This forms a flat spring on the filament support wire for taking up the expansion of the tungsten filament.

whole apparatus being contained in a box not much larger than an ordinary cigar box. In aero work the generator is driven by a small propeller situated in the slip stream of the aeroplane propeller. The apparatus is fitted in the tail of the aeroplane and the aviator connects up his head receiver and transmitter by two plugs.

As Used in the War —

The British Service has used these Radiophone Sets for more than two years past, and the vacuum valves in connection therewith have been worked out

Double headed riveter for fixing and determining length of filament. This filament must be very accurate in respect to its electrical resistance and the exact determination of length is therefore a matter of considerable importance.

to a degree of nicety by the radio engineers in England. They are, however, based on the invention of Mr. O. B. Moorhead of San Francisco, who holds an American patent for the cylindrical anode. These valves are known as the French valve and this is probably due to the fact that Mr. Moorhead sent some of his valves to France some time ago. Previous valves were of various types but generally with flat plate anodes, flat grids and W shaped filaments. The Moorhead valve, in addition to having the cylindrical anode, has a spiral grid and a central filament, making a completely concentric arrangement so that the distance between each of the elements is the same in all directions.

Earlier types of valves had a gaseous medium in the tube or bulb but in the modern devices great care and ingenuity are displayed in eliminating all traces of gases from the inside of the valve and a most severe test is imposed to insure that there shall be no blue glow when a high voltage is impressed on the anode and a specified dissipation is taking place inside the valve.

General view of glass machinery. The evacuating ovens are in the background.

Mechanically Constructed —

Not the least interesting feature of the Moorhead Valve is the mechanical construction thereof, it being the only valve which is not truly hand-made. The methods which have been adopted in the works in San Francisco have been necessitated by reason of the lack of skilled labor in this art and in order to obtain the production aimed at in the time limits. All the machines and devices which are used have been constructed or adapted in the Moorhead Laboratories by Mr. O. B. Moorhead and his staff who have worked day and night in bringing these appliances up to their present state of perfection. The operators also, with very few exceptions, have been taught their various duties so that valves are being produced which are absolutely uniform and mechanically sound. The staff of inspectors test every valve electrically and periodical records of a comprehensive nature are taken to insure that the product is maintained up to the standard of requirements.

Manufacturing Details —

The upper floor of the factory is principally concerned with glass work; the bulbs in the rough must first have their stems shortened to the required length and be tubulated for pumping. The tubulating is performed in a machine having two heads, one of which fuses the glass where the pip is formed, this being blown out by a small internal air pressure. In the meantime the tube is heated under another gas flame and the bulb is transferred to the carrier holding the tube and the two parts fused together. It is then taken to a head having a ring of flames which play upon the stem, the surplus metal falls

by gravity and the end of the stem is blown out and broken off, thus leaving a bell mouth for the operation of sealing in the elements. Two machines are employed for sealing the element support wires into their stems, each machine having four heads, and two more machines each with four heads seal the completed elements into the bulbs. After each sealing-in process the glass members are immediately placed in rotary annealers to eliminate cracking. After inspection the valves then pass to the pumps

Six double-headed basing machine, for cementing brass collars after evacuation has been accomplished

for evacuation. In the Moorhead Laboratory ten ovens are employed for pumping, each one being fitted with a Langmuir mercury vapor pump, each holding fifty valves at once.

The evacuation of these valves has been one of the principal difficulties that manufacturers have had to face, as the degree of vacuum requisite to insure a reasonable length of life is far in excess of anything that has previously been manufactured commercially. The reduction in the length of time which can be devoted to the pumping process is also an important factor in a commercial undertaking. This has been achieved in the Moorhead System of evacuation, and the rate of pumping exceeds a thousand valves a day at the present time, with only about half the ovens in operation.

Some of the machines which have been produced in order to insure uniformity and accuracy in the manufacture of the elements deserve particular attention, by reason not only of their ingenuity but also of the novelty of purpose for which they are employed.

The tungsten filament, which is of exceedingly fine diameter, must be very accurate in respect to its electrical resistance, and it also has to withstand a considerable degree of overload in testing. The tungsten wire is first crimped in a motor driven rolling mill, long lengths of wire being treated at one time. After the supporting wires have been sealed into their glass stem they are cut off to exact length in a combined machine; the first operation of the lever shears off the surplus metal, the stem is then placed in another position and a small hook is formed in the short wire which supports the lower end of the filament. The end of the hook forms the locating point for future operations.

The grid consists of a spiral coil which is wound in two-foot lengths from a spool of nickel wire. Each

One of the electrical testing outfits used by government inspectors, showing high reading and low reading voltmeters. Also the milliammeter for plate current, which has to show a voltage tolerance of not exceeding 2 milliamp. The micro-ammeter has to show a positive tolerance of 0.5 micro-amp. The filament ammeter must indicate a tolerance of 0.035 amp. positive or negative.

grid is cut off to exact length and is welded to its supporting wire in exact place by an electric spot welder. The anode cylinders are first stamped out from nickel strips and rolled into form in a specially constructed mill having three power driven rollers; they are then welded onto the supporting angle piece by an electric spot welder.

This system of spot welding has required a great deal of care in attaining its present state of perfection, as the work has to be done most accurately and the shapes and sizes of the material worked upon are very awkward.

After these elements have been centralized, the top supporting wire for the filament is placed under a drop hammer which flattens it at the bend and gives it the necessary amount of spring to take up the expansion of the tungsten filament when heated.

The system of fixing the filament to the supporting wires, though simple, is very ingenious, it being riveted in place in a machine with two heads which gauges off the exact length of filament every time. The surplus metal is cut away by hand.

After various intermediate operations the valve bases are cemented in place on a machine which is motor driven and having six double heads. In the first carrier the valve is brought opposite a gas jet which dries out the cement while the valve itself rotates, and upon touching a trigger the head rotates through half a revolution and the valve is brought opposite to an air stream which cools it down.

The remarkable uniformity of the product is evidence of the perfection of this system of manufacture.

"YOU MUST DISPLAY GOODS TO SELL THEM"

There is nothing more true than that attractive and conveniently arranged stores get the cream of the business. According to the Hardware World, it doesn't make any difference whether you are catering to the trade of men or women. People are influenced, unconsciously though it may be, by a neat, attractive store. A large part of sales are made by suggestion. People forget they need certain goods until they are reminded of them by display.

DISPOSITION OF OVERSTOCK

BY A. L. SPRING

(The taking of inventory at the beginning of the new year discloses always certain lines of stock of which the dealer has an over-supply. The question of what to do with this material in order to free the inactive capital is taken up by the representative of the California Electrical Cooperative Campaign in the southern part of the state, who suggests several ways of moving overstock.—The Editor.)

An Inventory Problem —

The disposition of overstock is a problem which confronts every merchant and with the electrical dealer it is a problem not easy of solution. At this time of the year when inventories are being taken, overstock is brought forcefully to our attention. Electrical dealers as a whole have not given this subject anywhere near the thought and attention which it rightfully deserves and which for the greatest success of the business it must have.

Overstock should, if possible, be disposed of at regular prices, but it is much more profitable at times to sell it at greatly reduced prices and even occasionally below cost than it is to carry it year after year, each succeeding year usually decreasing the chance of sale at any price.

Special Prices If Necessary —

Every merchant in every line of business makes special prices on overstock items and if in the electrical business they cannot be disposed of at the regular prices, special prices should be made and should be low enough so that the articles will move. In extreme cases, it is profitable to junk certain items instead of carrying them in stock for several years. It costs money to carry any article in stock and this should be taken into consideration at all times when overstock is studied. Now, while junk values are high, is the time to clean out and convert into cash some of that overstock which there is little chance of selling.

In my work as representative of the California Electrical Cooperative Campaign, I have seen a number of methods used by the electrical dealers in California in disposing of overstock. It might be well to consider some of these for a few moments as there might be a suggestion or two worth following.

Cooperation a Solution —

What is overstock for one dealer may not be overstock for another and also, by dividing a dealer's overstock among several dealers it probably would not be overstock for any of them and might in a reasonably short time be turned into money. There is certainly an excellent opportunity for valuable cooperation among dealers in the disposition of overstock, and the first thought a dealer should have in reference to the sale of overstock should be to sell it through cooperation with his competitors. If each dealer will help the other dispose of overstock much will be done toward solving the overstock problem.

Attracting the Attention of Customers —

One of the means frequently used by dealers to dispose of their overstock is to have in their store an overstock or bargain table on which is displayed various overstock and the table is plainly marked "OVERSTOCK TABLE" or "BARGAIN TABLE." Usually the prices of all the articles are shown in plain figures. There is a certain class of persons who are always looking for bargains and to them this kind of selling appeals and sales result. Also, with these goods in sight customers sometimes see articles that are just what they have wanted but which they would not have thought to purchase but for the policy which acted as a reminder.

One of the leading dealers uses another means of accomplishing the same results. This scheme is probably as effective as the other and at the same time is higher class merchandising. This dealer has purchased attractive oak boxes, the same as those used on desks for in-and-out mail and the smaller articles are neatly displayed in them and they are placed on a table in a good location in the store. The prices on all the articles are shown on price tags held up from the box by a wire frame. There is no suggestion that the items shown are overstock or are bargains. The prices tell the story and the results prove the plan to be effective. The scheme was instituted a few months ago and has since sold many articles which have been in stock for years.

Using the Window Space —

Show windows can be used to excellent advantage in selling overstock. One dealer every few months gathers together all of the overstock items which he can sell at the same price and attractively displays them in his window with a large window card similar to the following:

"SPECIAL FOR THIS WEEK"

"ANY ARTICLE IN THIS WINDOW FOR $5.00"

Another dealer uses his show windows to turn overstock into dollars by displaying articles of various prices and sizes, with a price card for each article on which is shown the regular price in black, with a line drawn through it, and the special price shown in red. This window is also sometimes used as a "Special for This Week."

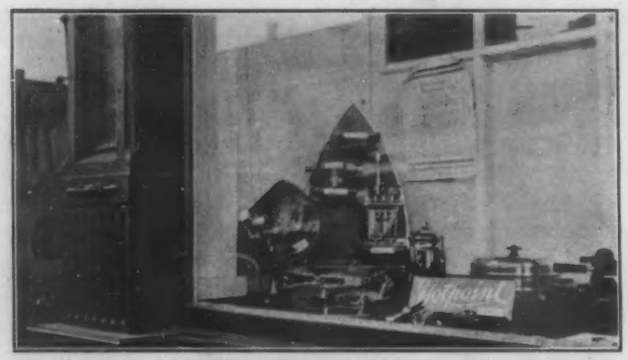
The Bonus Plan —

One of the best means of reducing overstock seldom used by electrical merchants, but which is frequently used by merchants in other lines, is paying a commission or bonus to the salesmen on all overstock articles sold. If this scheme is properly handled it will undoubtedly accomplish results and will not in any way antagonize the customers.

Generally speaking, nearly every method used to stimulate the sale of regular stock can be used to force the sale of overstock. Newspaper advertising, circular letters and effective use of manufacturers' advertising literature can and should be used to advantage.

Western Ideas

A LARGE ELECTRIC IRON is effectively used as a background in this attractive window by C. M. Lockwood of the electrical company of that name in Salem, Oregon. Hotpoint ware is featured, the material for the window trim being simply selected from that in stock plus the advertising matter from the manufacturer. The feature which attracted most



An iron as a display stand

attention was that of the large iron base which served as a standard to hold other ware. The window as a whole was well conceived and neatly carried out, and the feature of novelty which the mammoth iron introduced served as a distinctive item and helped to fix the display in the mind of the passerby.

LAMPS CRACKED BY MOISTURE often result in trouble for their user and in consequence to the store which sells them. Credit is frequently asked by customers for lamps claimed defective due to water cracks—a state of affairs which might be avoided if due precautions were observed. The following suggestions, offered by the Edison Sales Builder, will prove useful:

A high wattage lamp in a relatively small enclosing fixture requires proper provision for dissipating heat which can be done either by proper ventilation or sufficient radiation surface, or both.

To provide effective ventilation, the fixture should have openings of ample size so arranged as to give a chimney effect and thus induce a continuous draft through the fixture. Improper or restricted ventilation may be actually detrimental by drawing heated air to the parts of the lamp which should be kept cool.

Ventilation openings which allow moisture to collect on the lamp do more harm than good on account of the liability of this moisture cracking the bulb, so that outdoor fixtures should be weatherproof.

Ordinary enclosing fixtures, such as used for indoor lighting and small lightweight outdoor fixtures, when used with Mazda C lamps, especially of high wattage, require ventilation openings, otherwise the lamp would become too hot to give satisfactory life results.

Heavy outdoor fixtures usually have sufficient radiating surface so that ventilation is not essential, and if troubles from water cracks have been experienced it is suggested that the ventilating holes be plugged up to make the fixture more weatherproof.

Vapor-proof fixtures having small tight enclosing globes have practically no ventilation and relatively small radiating surface. While their use is justified under the extreme conditions for which they are intended, a sacrifice in lamp life may be expected.

AN INTERESTING BUSINESS CARD is that of W. I. Otis, Pacific Coast representative of the Square D Company. The first impression is that of an ordinary business card of slightly unusual shape. On turning the card over, however, a neat representation of a Square D enclosed switch box appears.

The card as spread out—only the middle section shows on first inspection. Below is the switch box cover which appears on the back of the card and above the interior of the box disclosed when the cover is folded back. Within is advertising matter on the subject of the switch itself.

The cover of the box proves to open, being secured by a flap inserted in a slit along the side of the box. The inside of this cover is also true to shape and below is shown the interior of the box with the switch in color and all details. Within the little folder is a description of the switch and some of its talking points and a list of some of the firms who have found it satisfactory.

A SIMPLE WAY OF ATTRACTING ATTENTION by tilting the reading matter makes this little notice of a change in prices effective. The slip of

FIXTURE PRICES WITHDRAWN
TO THE TRADE:—All List Prices appearing in our Fixture Catalogues Nos. 35 and 35A are hereby withdrawn. Revised Lists and discounts will be supplied upon application.
ELECTRIC APPLIANCE COMPANY
SAN FRANCISCO, CAL.

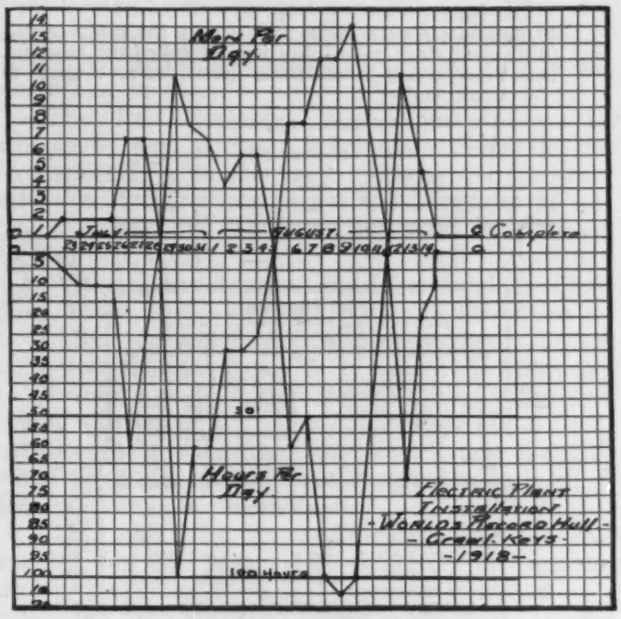
A notice which will be noticed

paper was itself of a giddy yellow—but it is obvious to the casual observer that the same notice printed horizontally across the page would appear tame by way of contrast. It is another instance of the value of the unusual.

CUTTING TIME ON INSTALLATION WORK

(A systematic planning of electrical installation work as it is carried out in a big ship yard which holds a suggestion for the electrical contractor. A plan of procedure, a treatment of green hands and a method of getting the best from the foreman which will recommend itself to other types of work as well.—The Editor.)

Against the background of figures gathered on installation of electrical equipment during the building of ships in the Ecorse plant of the Great Lakes Engineering Works previous to 1915, some other figures gathered since, as reported by the Emergency Fleet News, stand out rather boldly. Today if more than 1,100 hours are spent in the electrical installation for one of the 3500-ton freighters now



A chart which shows the record of accomplishment in electrical installation under a systematized scheme of work

under construction, something is wrong. Foreman Charles Bundesman knows there is, because his tables call for the work to be done in approximately 1,000 hours. Four years ago such an installation required, as a minimum, 4,500 hours.

The custom prevailing in many shipyards whereby individual measurements for each ship of one order are taken, has been discarded by Bundesman. Instead, he treats the whole order, whether it be five or fifty ships, as one vessel. Instead of one man measuring up one ship, and another, another, the best men in the department do the one job together.

With their figures as a working basis the whole ship is laid out from an electrical standpoint and blue prints drawn up. The measurements for the conduit and pipe runs in the pilot house, for instance, will be uniform on all ships of that order. Two men aren't going to have the chance to dispute as to whether a steel tape or a drug store ruler is the authority.

Fewer Men Used

The manpower aspect of this system is interesting because, where 15 to 25 men was the average quota for a ship of the same size three years ago, the average daily quota now is a fraction under three. Nor is there such a thing as overtime.

Under conditions at Ecorse the man of average intelligence will show enough ability after three months as a helper to merit a raise in station to that of handy-man and raise in pay as well. In six months more he will have become proficient enough to be a wire man. From then on his advance depends very much on himself. Bundesman has found that it usually takes six months for a wire-man to develop into a second-class electrician and six months more to become a first-class electrician, providing the man in question has applied himself to his work faithfully and intelligently.

Green Men on Unskilled Work

Only green men cut and thread pipes, wind coils, and do the other work that requires no particular skill. If he is a heavy man, weighing 180 pounds or more, he gets such a job as cutting and threading 1½-inch and 2-inch pipe. If he is a small man and not used to heavy work he gets the job of preparing ¾-inch and 1-inch stock. Only light men are used in pilot house work. It has been found by actual figures that better results can be obtained by their use there. A lightweight can do this work easily.

Intelligent distribution of green and trained men over one job—the building of a main line switchboard, for instance—will show some astounding results. Formerly this job was turned over to one or two trained men who saw the job through to the finish. Now a gang of mixed capabilities does it. Here is the time sheet for one of the main line switchboards recently built at Ecorse:

2½	hrs.	@	$0.72	$1.80
10	hrs.	@	.52	5.20
15½	hrs.	@	.46	7.13
5	hrs.	@	.52½	2.62½
1½	hrs.	@	.70	1.05
				$17.80½

The labor item on this job formerly was $50 and upwards. The 72-cent and 70-cent-an-hour men lay out the work on the slab. That is their only contribution. The rest of the work is done by men earning 46 cents an hour and up. The rule that high paid men are to supervise and low paid men to construct is followed out religiously.

With the labor item reduced to that low figure the cost of unpacking the slab and removing it from the store room and back again, $3.30, looms up rather large, proportionally.

Gives Men Splendid Training

In the 21 months during which Bundesman plans to make a first-class ship electrician out of a fairly intelligent and willing helper, he gives his men a splendid training course. The work is so arranged after the initial ship of the one order has been laid out that the work for all the order can be done without interruption, and without going through those

rush and slack periods that are apt to make the men discontented and hard to manage.

One ship is one job. All the material for one job is laid out in one pile on the store room floor. This pile grows constantly until the full electrical equipment for one ship has been prepared and gathered together. Then a new pile is started and added to. Through fair weather and foul a ship is being equipped electrically, whether the equipment is actually going into the ship or not. Each article in the pile has a tag which prevents both electrician and helper from going wrong, when the piece is to be installed.

By distributing men intelligently, each becomes a specialist along certain lines. A green man is set to work winding coils, another cutting and threading pipe, another (a lightweight) becomes a helper on pilot house work. He is not jerked out of his job peremptorily to do something he knows nothing about, unless there is a strong need for it. There are hundreds of ships being built and he knows that as soon as he has mastered one operation thoroughly he will get a transfer to a better job, as soon as an opening occurs.

The system works out more satisfactorily for the more able workman. He does not have to do work that a man of lesser ability can do. He doesn't enjoy winding coils or threading pipe when he can just as well be installing signals and doing other work that requires skill.

At present there are two ship bosses in the electrical department under Bundesman. One formerly was a holder-on in a hand-riveting gang. The other also was employed elsewhere in the yards, and was so dissatisfied with his job that he was ready to quit if he couldn't be transferred. He got his transfer, for Bundesman thought he saw a willing and conscientious worker in him.

Cut Time for Job

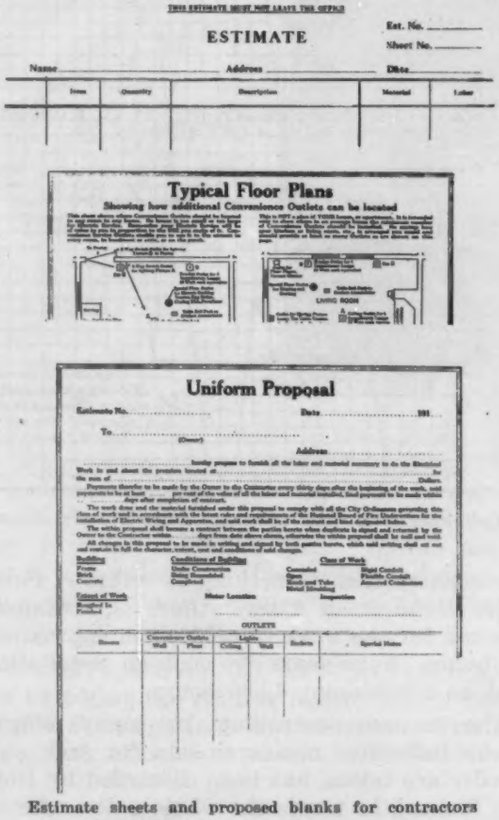
Today, these ship bosses are equipping vessels in 1,000 hours instead of 4,500 hours. Incidentally, these bosses are also efficient cogs in a "personality" machine. Each of them is required to make a monthly report on every man under him. On the card on which he makes his report he prefaces his remarks with the statement: "My honest opinion of man working under me on ship ..... is as follows." And then comes to Bundesman some mighty interesting and helpful information. "I recommend that R—— be laid off temporarily. He lacks initiative, but I would re-employ him if his productive ability improves," says one report.

Bundseman never treats the reports as final authority in his judgment of men, however. For it is possible, as he says, that the ship boss may form prejudices and conceive an inaccurate opinion of a man. To offset such an eventuality a man in disfavor with one of the bosses is transferred to the other man's gang. If he fails to earn that boss's good opinion he is transferred to the workroom where Bundesman watches him himself. The man has three chances to make good.

OUTLET BUSINESS STANDARDIZED

The Society for Electrical Development originated a series of simplified estimate and proposal forms for use in connection with the nation-wide campaign to save fuel, food, time, labor—by wire, which was carried out during the month of September last. The innovation met with so hearty a reception that steps have been taken to perpetuate the use of the forms. They have been put up in lots sufficient for securing thirty jobs of housewiring or installation of convenience outlets, and are offered to the industry in package form. The contents of each package comprise—

60 Uniform proposals (permitting 30 proposals in duplicate to be made. The customer signs and retains one copy).
30 Estimate sheets (to be retained by the contractor).
10 Typical floor plans, for use in soliciting business.
These can be had in additional quantities as desired, at nominal cost.



Estimate sheets and proposed blanks for contractors

The Typical Floor Plans serve as a chart in planning wiring and locating outlets. The reverse side of the sheet is headed "Convenience Outlets for New and Old Homes." Brief but convincing arguments are given in favor of outlets; it serves as a guide for the salesman in shaping his selling talk. Below that follows an itemized list of the several electrical appliances suitable for use in each room of an average well-equipped home.

The Uniform Proposal Blank is simplified to the last degree and is easily understood by the customer. The unique feature is the fact that this blank becomes a formal contract between the customer and the contractor without any other necessity than the customer's signature.

ELECTRICITY IN THE SCHOOLS

BY W. R. PUTNAM

(The use of electricity in the schools leads to the more extended use of electricity in the house. Not only is the next generation educated in the electrical idea, but they carry the convenience of it home and help to make their parents prospective customers. The possibilities for electrical cooking installations and electricity in shop work are here taken up by the head of the sales department of the Utah Power and Light Company.—The Editor.)

In our electrical education of the child we have too often neglected the opportunities afforded by the schools.

The cooking classes in the school give us opportunity to train electrically the future housewives. A modern and well equipped domestic science kitchen should contain an individual electric hotplate for each pupil and sufficient ovens so that each small group has an oven.

The first domestic science installations in schools were of portable hotplates attached to the feed wires by a flexible cord. This proved satisfactory except there was always the complaint of tipping food over and falling utensils from the elevated cooking surface.

With the assistance of the Diato Products Company, there was developed the idea of using the enclosed heating unit and making the cooking surface flush with the table top. To do this it was necessary to produce a non-combustible, heat insulating, fireproof, waterproof and smooth table top. Diato Products Company submitted samples of their diamaticious earth and showed that it would answer all of the requirements set forth.

This material has recently been put on the local market, but has been used extensively in Germany under the name of Kieselguhr. It is mined as a white soft rock and then pulverized to a fine powder of about the same fineness as flour. Great care is necessary in pulverizing the rock so as not to crush or squeeze the material and thus destroy the minute air cells which give it the high heat insulating value. After it has been milled to the desired size, the secret process used by the Diato Products Company is applied. This consists of the addition of certain chemicals to the powder until it reaches a consistency equal to that of mortar. It gives the finished product a tough, elastic and hard surface.

In the soft condition it is spread on the table top to the desired thickness and made into particular form desired. Any color desired can also be secured by the addition of pigment to the mud.

In the domestic science department using electric range enclosed units, a hole is cut in the table large enough to accommodate the connection plug and box. A sheet metal ring of almost the diameter of the hotplate is then placed around the hole with its top edge high enough to hold the rim of the hotplate flush with the table surface. The mud is then poured on the table and moulded as desired. This ring answers a two-fold purpose: it facilitates renewal of hotplates and prevents the mud from hardening around the plate and frequently damaging the top when the plate is removed.

After the mud has hardened for about twenty-four hours, the top is worked down to a smoothness almost similar to a hardwood table top and oil is worked into the surface to give it a gloss, make it waterproof and prevent checking. A second application of oil is applied about twenty-four hours later and the work is then completed.

The plate is then connected by a flexible cord and set on the metal ring and the equipment is then ready for use.

In case a cafeteria is run in connection with the school, electrically heated soup kettles, large bake ovens and electric ranges are desirable equipment and assist in helping the propaganda of electric cooking.

As a rule, the domestic science teacher affords the greatest assistance in securing an electrical installation in the schools. Oftentimes where the necessary funds are not available for an expensive and durable installation, a start can be made by installing grill stoves and similar equipment, which can later, without great loss, be exchanged for the standard equipment.

The increasing number of manual training installations provides the opportunity to educate the boys to the advantage of electric power. The central station should supervise the planning of the installation to insure a proper equipment so that the boy users cannot help but realize the convenience of this type of power, both in connection with wood and metal work.

As a rule, the above electric installations lead to the conversion of the steam-drive of the ventilating system in the school buildings to electric drive, with the result that an additional desirable load is obtained.

DATA ON WOMEN'S WORK WANTED

The Woman in Industry Service of the United States Department of Labor is collecting and distributing information on such topics as the extent of employment of women during the war, the wide variety of their employment, the methods by which they have been successfully introduced into new occupations, and the safeguards with which it has been necessary to surround them in the interests of their health and efficiency.

Plans are being made to establish a pictorial record of the work women are doing, and the Woman in Industry Service is asking for the cooperation of the employers of the country in assembling these pictures. Illustrations are designed of the various processes on which women are working, particularly those in which women are substituting for men; mechanical adjustments installed to enable women to do work formerly impossible for them; safety devices that have been found necessary to protect women workers, and special arrangements and equipment that have been installed for the comfort of the workers. When the photographs are forwarded it will be appreciated if a statement is attached of the name of the process and any other particularly significant facts. If the pictures are published the names of the firms from which they were received will not be used without permission.

WESTERN SECTIONS OF NATIONAL SOCIETIES

BY ROBERT SIBLEY

(A paper which was presented at the recent annual meeting of the A. S. M. E. in New York by the editor of the Journal of Electricity, who was joint delegate from the San Francisco Section to both the annual convention of A. S. M. E. and the Section's conference of the Society held in New York. The subject is one of such general interest in the West, with a bearing on the movement for united engineering effort, that the paper is here reproduced in full.—The Editor.)

When it is realized that the great and influential engineering organization known as the American Society of Mechanical Engineers has but two organized sections west of the Rocky Mountains, and when some conception of the vastness of this area coupled with the present wonderful possibilities for engineering development is brought to your attention, members of the Society can then formulate some conclusions as to the present difficult problem which confronts the Far Western Sections and which limits

ONLY TWO A. S. M. E. SECTIONS IN THIS REGION

A picture which shows the vast extent of the Western region and the importance of its enterprises in contrast to rather limited membership in the great engineering societies. If the northern border of California were in New York City, this mensuring stick of power lines down through California would traverse south across New Jersey, thence across Delaware, Maryland, Virginia, North Carolina, South Carolina, Georgia, and finally wind up somewhere near Jacksonville, Florida.

the helpfulness that could otherwise be rendered to this growing district by the Society, and, too, prevents the growth and expansion in membership in this region which is even now possible to a far greater degree than our present membership totals would indicate.

With an idea of vastness of the country involved and the magnitude of engineering effort called forth, with problems new to engineering design, members of the Society can readily appreciate how our two sections in the Far West, situated over 3000 miles from the Society headquarters, find contact with the Society as a whole extremely difficult. It is not surprising that we often find our arguments to induce our fellow-engineers to join the Society of little avail. For under such circumstances, since few of our men rarely visit New York City, and since the large number of questions discussed through the Journal of the Society are wholly foreign to problems that vex us for solution, it is difficult for local engineers, not members of our Society, to see wherein a fair return is to be received for the annual dues of fifteen dollars required for membership.

The Local Section Idea —

So those of us in the Far West who have this matter at heart see, in the fuller development of the local section idea, the only ultimate hope for profitable helpfulness both to the members and to the Society as a whole in its work for the betterment of the engineering profession,—not alone in New York City but in the far nooks and corners of this broad country of ours. With this ideal in view it would seem that for the ultimate development of Society effort west of the Rockies there should be established as reasonably soon as circumstances will permit, duly organized sections in the sea port centers such as Seattle, Portland, San Francisco, Los Angeles and inland centers such as Spokane, Butte and Salt Lake City. Such sections, if harmoniously organized in relationship to sections of other national engineering societies agreeable to some such scheme of organization as now prevails in San Francisco, will unquestionably reflect wonderfully the spirit of helpfulness of this great parent society, and contribute to a marked degree in recruiting new members, for mechanical engineers in the section west of the Rockies available even now in large numbers, will then see the possibilities for good in associating with such local organizations in their immediate field of activity, engaged in discussing the very problems with which they find themselves engaged in daily practice. Hence such a development of section activity in the Far West would contribute four vital factors in furthering engineering society activity:

1. It would interest local members as nothing else can.
2. It would make possible enlarged membership — a source of increased revenue for the future that would far repay the money invested.
3. It would make the Far West more accessible for Eastern members who are now either coming to these districts of the West in ever increasing num-

bers, or are en route to Oriental ports where new activities are engaging our membership.

4. And above all, it would immeasurably build up a larger and more useful American Society of Mechanical Engineers—at least so far as our district of the nation is concerned.

Joint Society Activity —

To make this section life of fullest usefulness a close spirit of cooperative helpfulness is necessary in each center with local engineers and with members of other local engineering societies in the district. The San Francisco section, through the very able efforts of its Chairman, Mr. E. C. Jones, himself one of our most distinguished engineers, who has done such wonderful work in the development of the oil gas industry, and who has devoted this same genius and tireless effort in developing our section program and activity for the year, has entered into a local joint arrangement with four other local sections of national engineering societies, which it is believed is practically ideal.

Briefly, this arrangement is as follows: The San Francisco Engineers' Club, which now has a monthly income from dues, not counting income from luncheons, of almost $1,000, has generously offered our section a table each week, when we have a section luncheon, at the same price it is offered to its own members. These weekly gatherings have proved very profitable and enjoyable. Once a month four of our members sit with four representatives each from the four other local sections of national engineering societies at what is known as the Joint Council. Prof. C. D. Marx, now acting president of Stanford University and who is a past president of the American Society of Civil Engineers, is president of this council, while our energetic section chairman, Mr. E. C. Jones, is vice-president. The function of this Joint Council is the furtherance of the common interests of the members of the engineering profession in the district and rendering of public service as opportunities arise.

Some concrete examples of the good that has already been accomplished by this Joint Council are as follows:

1. Definite dates have been fixed for the holding of individual section meetings to avoid conflicts in meeting nights.
2. The bringing about of a saving in labor and expense in secretarial work by joint use of addressograph and many economies in clerical help.
3. The joint offering of engineering talent for war service and for historical data now being called for by the War Department.
4. Joint action on very necessary legislative matters is being brought about, such for instance, as urging the appointment of an engineer member of the California Railroad Commission, an engineer member of the Board of Regents of the State University and legislation affecting the legal status of engineers in the commonwealth of California.
5. The establishing of an effective Service Bureau in which active effort is made to secure accurate information on vacancies open in engineering activities and the placing of capable applicants in employment.
6. The holding of two to three joint meetings of all national engineering societies annually, covering discussions of such broad interest that participation by the engineering profession as a whole would prove helpful; such, for instance, as fuel conservation, water power development and the like.

The Section and Its Activity —

And this splendid spirit of cooperative helpfulness which is made possible by the Joint Council, has assisted us in San Francisco in developing a section life that is almost ideal. Our section has held under its auspices the first combined meeting of all the local sections. The subject of the evening was Fuel Conservation, and eleven noted engineers and public officials, by presentation of papers, participated at the gathering. The attendance was perhaps the most representative ever held in San Francisco, excepting of course the gathering during the Exposition year of 1915. There were 325 engineers in attendance and the papers and discussions of this meeting have been widely quoted throughout the West. Meetings in which the section alone will participate are already scheduled for the year and every promise is apparent for their successful consummation. On December 16th a noon-day luncheon talk on pulverized fuel will be given by Mr. M. C. M. Hatch, of the Locomotive Pulverized Fuel Company of New York, at which meeting we expect to have at least one hundred engineers present. On December 19th our evening meeting will be devoted to the Diesel Engine and its use in ship propulsion. Three splendid papers are being prepared for the occasion and it is believed that the fuel oil situation in the West will be better clarified from the discussions. In January our section will have an evening given over to a smoker and a general get-acquainted meeting at the Engineers' Club room, and so on down through succeeding months, profitable social and technical meetings are in the making, and in addition to all this, we have each week our informal luncheons of our section at the club rooms.

The Question of Expense —

In the Far West we realize full well the trying stress, financially, under which the mother society labors to meet the vast outlay necessary to put through the progress of national helpfulness the Society has undertaken. It is the firm conviction, however, of your Far Western Sections, that more effort and financial assistance devoted to this growing district of our country would not be a matter of charity, but the actual money returns in an immediate influx of new members would not only strengthen the Society nationally but would create an increasing financial revenue in dues that would prove a permanent gain many times the outlay involved. In addition to this financial assistance we need more personal contact, we need the broadening assistance derivable alone from hearing men of eminence in our profession in these Western centers as well as men familiar to our localities, and we hope some means may be secured whereby the leaders when visiting our district may make themselves better known and advantage be taken of their helpful counsel.

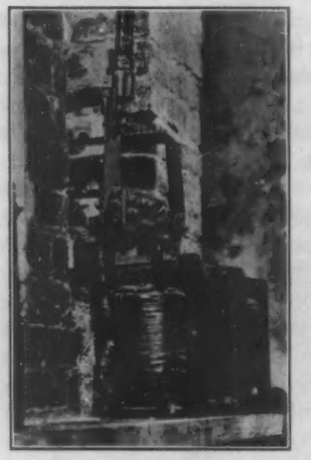
In conclusion I would say that it is only by this mutual cooperative helpfulness that we can ever hope to raise the standard of the profession as a whole to its ultimate goal of usefulness, for only in such manner can the individual hope himself to prosper and can we ever hope to bring out that ultimate beautiful and high standard of individuality which is unquestionably the hope of all of us.

SAVING THE WASTE WITH AN ELECTRIC FURNACE

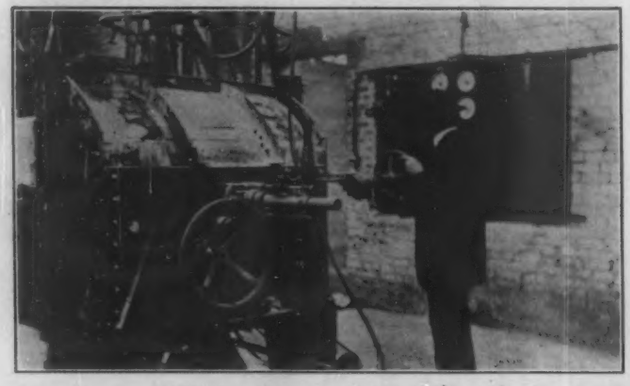
BY C. B. MERRICK

(The installation of an electric furnace which has more than met expectations. Not only does it admirably serve the purpose for testing out special grades of iron, but it adapts itself readily to the utilization of waste materials and is largely fed on scrap iron from the shops. The resultant product passes a very satisfactory test.—The Editor.)

The electric furnace has become recognized as invaluable for special uses in connection with foundry work. As with all electrical appliances there are features which recommend it in preference to the methods it has to a certain extent replaced. In accordance with the progressive policy of that company the Pacific Foundry Company, located at 18th and Harrison streets, San Francisco, has installed a furnace for experimental use with iron, to be used in conjunction with the cupola furnaces which had been previously entirely relied upon. The demand for special grades of cast iron, with particular qualities—such for instance as a resistance to acids, etc.—has been met to such an extent that the installation of the electric furnace for the distinct purpose of further investigation was considered justified. Consequently a two-phase Rennerfelt Furnace of 750-lb. capacity was put in



Reactance coil to prevent overload



Adjusting the arc of the electric furnace

and is now utilizing small pieces of waste iron such as nails, borings, etc., which could not be successfully placed in the cupola furnace, the resultant saving amounting to a considerable item.

The furnace as installed is shown in the accompanying photographs, the three electrodes extending into the furnace from the top and both sides. The top one is the common electrode of the three-wire two-phase system of power supply, while the others are connected to the outside wires. In the first view the operator is shown adjusting one of the side electrodes by means of the hand wheel and gears which control the operation of feeding. The electrodes are made in sections, threaded so that the new section screws onto the old, with resultant economy of carbon. The large hand wheel at the left of this view is used for dumping the charge from

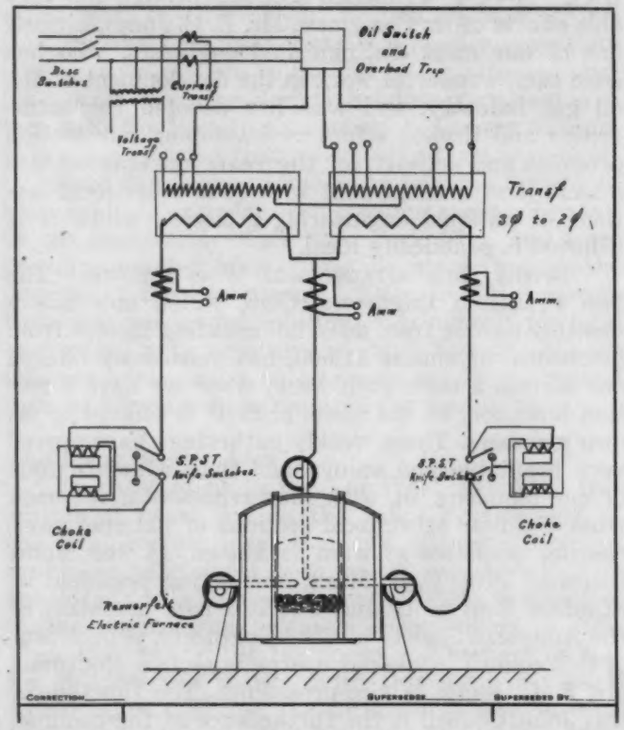
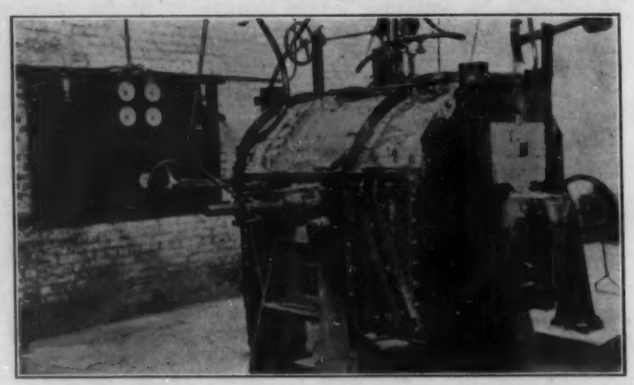


Diagram showing layout and connections of the electric furnace as in use at the Pacific Foundry Company's shops at 18th and Harrison streets, San Francisco.

the furnace, which pours through the gate at the end of the furnace, as shown in the second view. This also shows the hose connections at each elec-



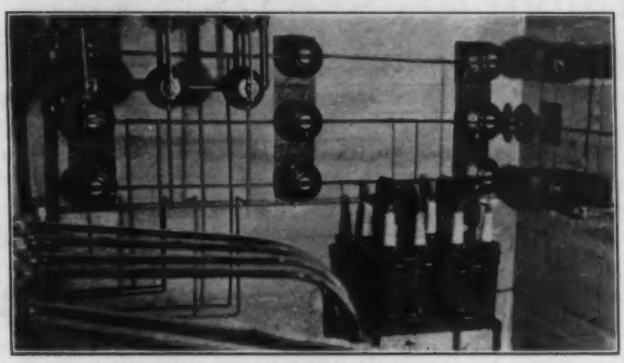
An electric furnace as installed by the Pacific Foundry Company which is used for experimental purposes, melting up scraps of waste iron and thus serving two purposes.

trode which supply water to the jackets used for cooling purposes.

Meters and reactance coils in each phase indicate exact operating conditions and prevent excessive overloads. Power is supplied by an 11,000 volt

tap from the system of the Pacific Gas and Electric Company.

The electric furnace has been largely used for steel products, but this experiment has been exclusively used for iron to be cast. It produces an iron with a lesser percentage of carbon than that available in the cupola furnace, as some of the carbon is burned out in the electric furnace. This results in an iron with very desirable qualities. A typical iron has about 2.8 per cent carbon, ½ per cent sulphur, silicon and manganese as desired, and no phosphorus, as this would tend to make the iron brittle when cold.



Switches and meter transformers

The possibilities of this method are well illustrated by tests which have been carried out at Columbia University on castings made direct from steel scrap in an electric furnace. The strength as shown by these tests ranged from 40,730 to 45,030 pounds per sq. in., or considerably higher than ordinary cast iron.

SOME REFERENCE BOOKS OF VALUE TO ENGINEERS

BY LOUISE B. KRAUSE

(Next to knowing a fact is to know where to find it, according to the old adage—and this is particularly true if you are building up a library within your own organization. The following group of essential reference books for public utility engineers has been selected by the author from years of experience as librarian of H. M. Byllesby & Company, Chicago.—The Editor.)

All engineers have need often to consult reference books for specific information in connection with their work, and it is the purpose of this article to bring to the attention of engineers of public utilities some sources of information of practical value to them in the prosecution of their work.

Directories

Information as to who, what and where are certain utilities is constantly asked. Every utility engineer should be acquainted therefore with the contents of **McGraw Central Station List,** published annually, price $15, by McGraw-Hill Company, New York City, a list of central stations in the United States and Canada arranged by states and cities. Population of the town or city, controlling interest, names of officers, capitalization, list of power house equipment and extent of service of the various companies are given. Examine the volume for additional lists and note the index to central stations whose names do not indicate their location.

The N. E. L. A. Rate Book, published annually with quarterly supplements by the National Electric Light Association, New York City, price $10, gives rates for electric light and power in cities of the United States and Canada having population of 25,000 and up.

McGraw Electric Railway List, published semi-annually—February and August—price $7.50 a year, treats the electrical railway field in the same manner as the Central Station List does its field.

Brown's Directory of American Gas Companies, published annually by Progressive Age Publishing Company, New York City, price $5.00, is a complete directory of all artificial and natural gas companies of the United States arranged by states and cities, giving data on population of city, controlling interest, names of officers, list of equipment, data on production and by-products, statistics of sales and prices of gas. The volume also contains lists of oil producers and oil refiners with data on their operations. The contents page of this volume should be carefully examined in order not to overlook the valuable information contained in its supplemental lists.

The organization, personnel of management, earnings and financial histories of public utilities are recorded in **Poor's Manual of Public Utilities,** price $7.50, published annually by Poor's Manual Company, New York City. The same information can be found also in **Moody's Manual of Public Utilities.** Both of these volumes contain excellent maps of important distribution systems.

Thomas' Register of American Manufacturers—first hands in all lines—is an indispensable directory. It is published annually by the Thomas Publishing Company, New York City, price $15. The entries are in three main sections. The first section classifies the manufacturers according to their productions, in an alphabetical list; the second section lists the manufacturers alphabetically by their names; the third section lists all the popular trade names alphabetically.

Government Documents

The United States Government is one of the most important publishers of accurate information of interest to engineers, and no data should be compiled without taking into consideration the sources of government information on the subject. The following are a few of the most important publications of interest to engineers who are concerned with the construction and operation of public utilities.

All engineers concerned with the development of hydroelectric projects must know where to find accurate stream flow and rainfall records. The principal source of information on stream flow is the **United States Geological Survey,** in which gage heights, rating tables and discharges in second feet

are given of a large number of rivers classified under their respective water sheds.

The United States Geological Survey has also published in its water supply series, papers on the water resources and water powers of certain states and regions which supplement the papers recording the stream flow in various water sheds. There will also be found in the list of publications of the United States Geological Survey important papers dealing with irrigation, underground waters and flood conditions.

The Director of the United States Geological Survey, Washington, D. C., will send free of charge on request, a valuable catalogue of publications which lists all of these papers, many of which may be obtained free of charge. Water supply papers 119 and 340 contain alphabetical indexes of all names of rivers on which stream gaging stations have been maintained.

The Topographical Map Sheets published by the United States, showing the territory surveyed with the names of the topographic sheets for ordering, may be procured free from the Director of the Geological Survey. The map sheets sell for ten cents each, in lots of fifty or more, six cents each. The Superintendent of Documents, Washington, D. C., will supply free of charge a catalogue (price list 53) of all the maps issued by the different departments of the United States Government, giving description and cost.

No hydroelectric investigation can be adequately conducted without reference to the rainfall data of the region. **The Monthly Weather Review** and **Climatological Data,** both published monthly by the United States Weather Bureau, are the best sources of information for rainfall data and the engineer who has access to a library containing volumes covering complete records to date will be most fortunate.

A catalogue of the publications of the **United States Bureau of Standards** may be obtained free from the Bureau which lists most valuable publications; many of these can be obtained free of charge or at small cost and are of great value to electric and gas utilities. Some of the publications deal with the standards for electric and gas service, electrolysis, specifications for electric wires and cables, electrical safety codes and other similar information.

The catalogue of the publications of the **United States Census Bureau,** free also for the asking, gives a list of valuable statistical publications dealing with central stations, electrical railways and telephones in the United States.

The United States Bureau of Mines will furnish a list of publications on tests of fuels, boiler and furnace efficiencies and other information of interest to engineers concerned with the operation of power plants. Every utility engineer should get copies of these government lists and check the titles of the publications which will be of aid to him in his work. He should also watch the "Books and Bulletins" column of the Journal of Electricity for announcements of new government publications.

Decisions of Public Service Commissions

The Public Utilities Reports Annotated, published by the Lawyers Co-Operative Publishing Company, Rochester, N. Y., contain all important decisions of public service commissions and state and federal courts. The decisions are issued currently in pamphlet form and are finally issued in bound form of which there are six volumes for each year costing $5.00 per volume, with a digest costing $2.50. This system of reporting is most valuable because many commissions do not print their decisions currently and they are not conveniently available before an annual or biennial report is issued. The Public Utilities Reports Annotated are also specially valuable because of the excellent analyzing and indexing of all information contained in each decision. The engineers who value utility properties and those concerned with the problems of engineering, financing and operation of utilities will find these reports indispensable in their studies of all important questions.

THE ELECTRICAL SIDE OF TRAINING AEROPLANE OBSERVERS

Conditions of aerial observation above European battlefields were so cleverly simulated at the School of Military Aeronautics at the University of California that cadets training for commissions in the Air Service got practical experience in estimating corrections for artillery fire and in conducting shoots, in spite of the fact that they were thousands of miles from the scene of an actual engagement.

The essential feature of the miniature range for the study of aerial observation is a painting of a section of the country in the same perspective as it would appear from an airplane. The painting is made on canvas, sized to be rendered translucent, and is based on a section of the artillery map given each student. The scale is such as to represent to the eye of the observer in the gallery 16 feet above, the same appearance the actual country would represent from a height of about 11,000 feet. Two balconies extend around the artillery observation room, the upper one being the observer's gallery and the lower one the gallery of the battery commander. Communication between two men working together as battery commander and observer is established through imitation wireless sets. The observer may receive messages by head telephone, signal lamp or miniature ground-strips. The battery commander always receives by head telephone.

About 500 small electric lights are set in the floor. Some of these illuminate numerals which represent definite points for the observer to locate and report. Others are points of light representing bursting shells around the 36 targets. The latter, or "bursts," are controlled by switches on the battery table, which the battery commander can operate when the signal to fire is given by the observer. The observer estimates the correction for each burst and signals it to his battery commander by wireless. Corrections are then made.

SPARKS—Current Facts, Figures and Fancy

(Post war problems as they are being met in England and in France, a suggestion of the reason for some past failures in foreign trade as typified by moving pictures in Mexico, a bit of history and various advances along electrical lines of modern day interest.—The Editor.)

It is stated that Damascus—the oldest city in the world—was the first city in Turkish territory to have electric tramways and lighting.

* * *

Recognizing a need for closer organization in attacking post-war problems, British industries are appointing joint committees to report on fundamental questions. Labor, conditions of manufacture, foreign trade policies and parliament legislation are among the problems attacked by the boot and shoe industry, for instance.

* * *

The National Kitchen tramcar in service at Halifax, England, serves an average of 700 portions per day. The car is run on routes where a half-hourly passenger service is in vogue, and stops 28 minutes at selected spots for the distribution of food. In spite of the extra cost, owing to the presence of the driver and conductor, and the cost of electricity for running the car, the venture pays its way.

* * *

Direct wireless communication between Great Britain and Australia was established last September, when two messages from England were received by the Amalgamated Wireless Company of Australasia from the new station at Carnarvon. The messages were received at Sydney perfectly clear and distinct, despite direct transmission over 12,000 miles. They were confirmed verbatim by cable on the following day.

* * *

To encourage devices and inventions calculated to improve the operation of American railroads, the United States Railroad Administration has promulgated rules and regulations designed to assist inventive genius in securing the proper attention. Provision is made for examining all models and plans and passing upon their practicability. In all cases, complete data must be forwarded to Washington and becomes a part of Federal files.

* * *

The majority of industrial accidents are unavoidable, according to a report of the "Health of Munitions Committee," and the best one can hope is to reduce their number. Contrary to the popular idea, fewer accidents occur during night shifts, because the workers settle down to a calmer mental state than in the day. The number of accidents increases also with the colder weather and decreases again as the temperature rises.

* * *

The largest private telephone branch in the world is the one which serves the expanding needs of the U. S. War Department. It fills a specially constructed three-story brick building containing forty-four "positions," an office larger than the "central" in many a city. In equipping this branch all records for speed were broken. Messengers were summoned from distant cities under instructions to carry needed material by trunk-loads, paying excess baggage.

* * *

The problem of submersion in the first design for a submarine boat was solved by means of two side tanks into which water could be admitted through perforations and from which it could be expelled by forcing the inner side of each tank outwards. These false sides were made tight with leather suckers and moved by winding hand-screws. Although this ship was of British design, the first practical submarine was built by a Dutchman.

* * *

The iron and steel industry of France which in 1913 produced nearly 21 million tons of iron ore is to be rehabilitated as soon as possible after receiving it back from the hands of the Germans. The method is to gather the best information available regarding the extent to which iron mines, blast furnaces and steel works have been destroyed, and on this basis prepare purchase programs. Much of the special equipment needed will have to be furnished by the United States.

* * *

By the use of power planes in the ship yards some 2,000 men have been released for other service. The air planer has jumped into instant favor and been adopted by all wood yards in which it has been demonstrated. The wearing parts of the instrument are so few and so well protected that it is said not one has had to be replaced, although some have been in service ten months. In a demonstration on the coast recently a workman with the tool planed 385 square feet in five hours. Eight men working against him by hand finished 275 square feet in seven hours.

* * *

A report from Mexico shows that American motion-picture films, like other American products, would be a much more popular item than they are at present were it not for the lack of foresight of a great many of the companies sending films here to be exhibited. The familiar border scenes, which almost always show Mexicans as the villains, have time after time been sent here to wound the feelings of a very sensitive people. The reaction after the exhibition of a film of this kind is naturally very great and the popularity of American products suffers as a consequence.

PERSONALS

Ira J. Francis, who for the past eighteen months has been western manager of John A. Roebling's Sons Company of California, has been elected president of the company to succeed Squire V. Mooney, deceased. Mr. Francis comes to his new responsibility with ideal qualifications. For many years he has served his company in varying capacities. He possesses a rare wit and humor that makes for him a host of friends on all sides. Men of the industry look forward not only to a brilliant future for him in his company's activities but they feel that a decidedly helpful factor in the upbuilding of the industry as a whole is added by his new position of prominence and influence in his company.

John Schram, well known electrical man of Seattle, has been a recent San Francisco visitor.

H. N. Lauritzen, special Holophane representative with the Pacific States Electric Company, is in New York City.

L. R. Cady, manager of the Lassen Electric Company, Susanville, California, was among the out-of-town guests attending the annual Wass-Hael dinner at San Francisco on December 21st.

S. R. Hemphill, president of the Hemphill Trade School of Portland, has invented and patented a mechanical instrument to locate and clear short-circuits and other electrical troubles in Ford magnetos.

C. S. MacCalla, formerly general manager of The Washington Power Company with headquarters at Spokane, is now located at Schenectady, N. Y., where he is in the employ of the General Electric Company.

H. F. Jackson, president and general manager of the Sierra and San Francisco Power Company, who has spent recent weeks in New York City and at the national capital, has returned to San Francisco.

G. E. Emmons, vice-president of the General Electric Company, in charge of the manufacturing end of the company, has been a recent visitor to the Pacific Coast where he spent some time in San Francisco.

Chas. E. Oakes, associate electrical engineer of the Bureau of Standards, has recently spent some time on the Pacific Coast in the interest of greater cooperation between the Bureau and electrical interests of this region.

C. B. Merrick, who severed his connection with the Journal of Electricity last June to become an instructor in the Aviation School at Berkeley, California, is again at his post in the circulation department of the Journal of Electricity.

Tracy E. Bibbins, president of the Pacific States Electric Company, has undergone a severe operation at St. Luke's Hospital in San Francisco. From latest reports it is surmised that Mr. Bibbins is recovering as nicely and as rapidly as can be expected.

C. E. Ingalls, who has been joint sales representative of the Crocker-Wheeler Company at San Francisco with **W. K. Brown**, has been appointed district manager at San Francisco coincident with Mr. Brown's appointment as district manager at Newark, N. J.

Harvey W. Brundidge of the Los Angeles Express and **Irving Martin** of the Stockton Record are the two new appointees of the California Railroad Commission. The vacancy caused by the resignation of Max Thelen last June to enter war work at Washington has not as yet been filled.

George A. Pope has resigned from the directorate of the Federal Telegraph Company, the operating company for the Poulsen Wireless Corporation. The vacancy caused by Mr. Pope's resignation has been filled by the election to the directorate of Hiram Johnson, Jr.

L. B. Jones, assistant gas engineer for the Pacific Gas & Electric Company, is again back at his work in San Francisco after an absence of several weeks at camp where he was undergoing training for a commission, as announced at some length in the columns of the Journal of Electricity, October 15, 1918.

Brigadier-General George H. Harries, in civilian life a vice-president of H. M. Byllesby & Company, was the ranking member of three American officers first to reach Berlin since the signing of the armistice. General Harries and his aides arrived in Berlin December 10th, as members of the American commission for the repatriation of war prisoners.

Geo. F. Swain, professor of civil engineering at the Massachusetts Institute of Technology and Harvard University and a distinguished consulting engineer well known to the West, is one of the American engineers chosen to go to France to sit with French engineers on problems of reconstruction. He will be abroad for something like six weeks on this work.

F. P. Gay, New York manager of the Pelton Water Wheel Company with headquarters in New York City, was a recent attendant at the annual convention of the American Society of Mechanical Engineers and Western delegates, who had known Mr. Gay as the J. G. White & Company representative in San Francisco in former years, found him interesting and enjoyable as ever.

E. J. Schneider has been elected president of the San Francisco chapter of the A. S. C. E. with **M. M. O'Shaughnessy**, city engineer of San Francisco, as vice-president and **Nathan A. Bowers**, western editor of the McGraw-Hill Publishing Company, as secretary. The organization has been holding very active meetings and has entered into cooperation with electrical and mechanical engineering societies in their joint meetings.

Harry Coe, vice-president and formerly assistant cashier of the Anglo and London Paris National Bank, has been promoted to the position of cashier of the institution, to succeed Challen R. Parker, who left the bank recently to accept a position with the Guaranty Trust Company of New York City. Mr. Coe is well known to the readers of the Journal of Electricity through his articles on oriental finance which have appeared in these columns.

Major George F. Sever, western representative of the Chief of Army Engineers, U. S. A., who has been actively assisting the War Industries Board for some months past in matters connected with the power situation in the West, has closed his offices in San Francisco and returned to Washington, D. C. The fruits of Major Sever's labors are set forth on other pages of this issue. His investigations have been painstaking and accurate and will undoubtedly serve to hasten a more workable water power legislation being enacted by Congress. The best wishes of men of the industry go with Major Sever in his return to Washington, as it is felt that he has been a faithful and efficient public servant in the performance of his difficult duty in the West.

W. R. Putnam, salesmanager of the Utah Power and Light Company, has returned to Salt Lake City after a profitable and interesting trip to the Atlantic City conference of the National Chamber of Commerce, where four thousand delegates assembled from all over the nation to discuss reconstruction problems. On his return west he visited the Taylor-Street Plant of the Edison Electric Appliance Co., Inc., at Chicago, where a luncheon was served in his honor and in honor of Ribert Sibley, editor of the Journal of Electricity, who was also en route home from the reconstruction conference of the A. S. M .E. held recently in New York City. The hosts of the pleasant occasion were Geo. A. Hughes, president, John D. Cross, plant manager, C. P. Randolph, chief engineer, E. H. Richardson, inventor of the Hotpoint Iron, and C. M. Lindsay, assistant to the president. About five hundred employes are busily engaged at this plant manufacturing electric ranges varying in size from the toy to the vast bake oven for commercial practice, in addition to a large government order for helmets and gloves to be used in the aeroplane service. A highly developed spirit of loyalty and enterprise pervades the establishment and the electrical man from the West will find much of profit and interest in visiting an establishment of this high standard of excellence.

H. J. Gille, sales manager of the Puget Sound Traction Light and Power Company, has been chosen president of the Northwest Electric Light and Power Association by the executive committee to take the place of L. B. Faulkner, who resigned on account of pressure of work in his new duties as president of the Olympia Light and Power Company.

Lieutenant A. E. Burghduff, formerly engineer for the Home Telephone Company of Portland, Oregon, who enlisted in November, 1917, in the officers' training camp in San Francisco and who is now in France, recently was promoted to a captaincy.. Captain Burghduff was one of the first four men to get commissions from the O. T. C. in San Francisco.

H. H. Jones, general manager of the San Diego Consolidated Gas & Electric Company, has been appointed chairman of the Pacific Coast Section N. E. L. A. convention which is to be held in Coronado this spring. Mr. Jones has already made a reputation for his section of the country in hospitality through the most delightful convention of the Pacific Coast Gas Association which he directed some years ago—and a most successful gathering is promised under his able management.

E. H. Richardson, inventor of the "Hotpoint Iron," who has for the past several months been engaged in New York City, Schenectady and Chicago in work related to the Edison Electric Appliance Co., Inc., has returned to California. Mr. Richardson joined his wife and daughter at Berkeley, California, where his daughter is attending college, and from there motored to his home in Ontario, California, the home, too, of the "Hotpoint Iron."

Challen R. Parker, formerly cashier of the Anglo London Paris National Bank, is now vice-president of the Guaranty Trust Company of New York City, a banking corporation with five hundred million dollars deposits. This is the same institution to which Willis Booth of Los Angeles, chairman of the Board of the Edison Electric Appliance Co., Inc., goes on January first as vice-president, as announced in the last issue of the Journal of Electricity. This great financial institution of New York City is manifesting its confidence in the future of the Pan Pacific area by sending fourteen banking experts to the Orient in opening up oriental connections under the name of the Asia Banking Corporation.

OBITUARY

Harry L. Bleecker, vice-president and general manager of The Washington Water Power Company, died in New York City while on a visit to that metropolis, on Dec. 11, 1918, of pneumonia following a severe cold and a slight attack of influenza. Mr. Bleecker was 45 years old and since coming to Spokane 16 years ago has been continuously associated with power development in the great Inland Empire of the Northwest. He was recognized as an able builder. Typical of his readiness to help every factor engaged in the upbuilding of the West was his recent emphatic endorsement of the Journal of Electricity and its work in which he wrote: "I would say that it is more closely read than any other publication of its class that we receive, and we look for its receipt with keen pleasure." His loss to the power industry in the West will be keenly felt.

Thomas S. Nelms, salesman with the Pacific States Electric Company at San Francisco, died recently at his home in Mill Valley of influenza. During the past few weeks Mr. Nelms, who was on his annual furlough, had been devoting his time to caring for those stricken with the disease. His loss is deeply felt by the many who knew him well.

A PROMINENT GROUPING OF THE RECENT ANNUAL CONVENTION OF THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

In this view are to be found The Council, Local Sections Delegates and the Committee on Aims and Organization. This convention was held in New York City, Dec. 3-6, 1918. Two delegates were called east from west of the Rocky Mountains — Robert Sibley, editor of the Journal of Electricity at San Francisco and Chas. H. Repath, a noted metallurgical engineer of Los Angeles. The keynote of the conference proved to be the strong plea presented by the Section's delegates to give greater emphasis to develop strong local sections of the Society throughout the Nation. The report of the San Francisco delegate emphasizing this feature is found in full elsewhere in this issue.

MEETING NOTICES FOR ELECTRICAL MEN

(Christmas meetings were held by most of the electrical organizations up and down the coast during the last two weeks — and various informal gatherings are planned for the new year. A service bureau is planned by the engineering organizations of the San Francisco bay region which should help in the adjustment of employment questions with the technical men who have returned to civil life from the army.—The Editor.)

San Francisco Electrical Development League

The San Francisco Electrical Development League held a Christmas luncheon on Monday, Dec. 16th, at the Palace Hotel. Stunts and poems were the order of the day. Chief among these were the new invention featured by Tracy Simpson and the poem by E. M. Cutting in honor of the recent toastmaster of the Supply Jobbers' convention at Del Monte. A most interesting address was given by Alfred Holman, editor of the Argonaut, who spoke on "War Torn Europe" as he had opportunity to observe it in his recent trip through that region.

The meeting of Dec. 23rd was Kiddies' Day and wives and children were invited to enjoy the tree and the Christmas spirit.

Jovian Electric League of Los Angeles

The Jovian Electric League of Los Angeles, with a wish to cooperate with the City Health Department in stamping out the recent outbreak of influenza has postponed indefinitely its Wednesday luncheons. Miss Gertrude Tucker of the Southern California Edison Company is to be chairman of the Ladies' Day which will be a feature of the league as soon as the Health Board permits. The bulletin which makes this announcement is further enlivened with poems and news items.

Oregon Drainage Congress

The annual meeting of the Oregon State Drainage Association will be held in Portland at the Imperial Hotel on January 8th. The meeting will be held in conjunction with the session of the Oregon Irrigation Congress and many matters of importance in irrigation and drainage work will be up for discussion.

A complete program has been prepared, including talks by W. J. Kerr, president of the Agricultural College; Dr. Samuel Fortier, chief of the Federal Drainage Investigations; Edgar B. Piper, editor of The Oregonian; Dr. Elwood Meade, and others.

Seattle A. I. E. E.

At the meeting of Dec. 17, 1918, the Seattle section of the A. I. E. E. enjoyed a discussion of the paper by H. A. Horner on "Electric Welding—a New Industry." The paper was one which appeared in the October Proceedings—and was discussed by members from its various angles and local aspects.

The Engineers' Service Bureau

A service bureau is being established by cooperation of the San Francisco Sections of the Am. Soc. C. E., Am. Inst. E. E., Am. Soc. M. E., Am. Soc. Min. Eng. and the Amer. Chemical Society. It is a joint endeavor on the part of the several sections to provide a clearing house (1) through which engineers in search of employment may get in touch with prospective employers and (2) through which employers may find technical men promptly as they are needed.

The bureau is to be provided with as complete a list of engineering vacancies as it is possible to compile and endeavor will be made to keep this list up to date. Applicants will write their qualifications and experience on a blank form and send them in by mail. As these applications come in they will be compared with the "engineers wanted" list. If a call is found for a man with the qualifications given, the applicant will be notified at once. Otherwise his application will be filed without acknowledgment awaiting a call. Blanks may be had at the office of the secretary of each of the five sections. Applications must be mailed to "Service Bureau," Engineers' Club, 57 Post street, San Francisco. The Service Bureau will give information to applicants only by mail or telephone. As the matter cannot be handled otherwise, there will be no exceptions to this rule against receiving applicants in person.

BUILDERS OF THE WEST—XLIV.

JOHN H. LEWIS

Unification of the water code, making possible a workable plan for the utilization and safeguarding of the most valuable asset of the great West — namely, its vast water resources — has in large measure been the contribution of John H. Lewis, until recently state engineer of Oregon, to the upbuilding of the West. It is with unusual pleasure that the Journal of Electricity dedicates this issue, devoted to Reconstruction Problems, to Mr. Lewis, the new engineer-manager of the Warmsprings Irrigation District at Vale, Oregon, and wishes him godspeed in the vast reclamation development he now has in charge.

Portland Electrical Contractors and Dealers

The regular semi-monthly meeting of the Portland District of Electrical Contractors and Dealers met in room 248 of the Oregon Hotel Monday evening, Dec. 9, 1918.

The State of Association committee reported progress; the committee on Wiring Schedule reported that owing to the sickness of E. W. Pierce it was unable to hold a meeting but that they would have a report in by the next meeting.

The chairman reported that the city planned having a public Christmas tree celebration at the Liberty Court Christmas Eve, and asked that the contractors' association donate the illumination. He further reported that the union would furnish the labor necessary, and it was up to the contractors to furnish the necessary streamers and lights. Upon a motion made by Mr. W. O. Fouch it was decided to cooperate with the general committee in this program, and upon a further motion a committee of three, in addition to the chairman, was appointed to attend to final details. Those appointed as a committee were: J. H. Sroufe, chairman, F. C. Green, W. F. Murphy and Frank Pierce.

The committee appointed to investigate in regard to the Friday Electric Page reported, through the secretary, that from then on until Christmas they intended to publish in the page cuts of electrical appliances and boost the giving of electrical appliances for Christmas gifts.

A get-together dinner staged by the San Francisco Development League and the Pacific Coast Section N. E. L. A. to awaken mutual interest in the two organizations and in general to prepare the way for a successful spring convention of the N. E. L. A. at Coronado. The time of this convention has not been definitely set but it will probably be held some time in May. The exact date will be determined at a meeting of the executive committee on Jan. 4, 1919 in Los Angeles.

Under new business J. C. English proposed a motion that a committee of three be appointed to draft suitable resolutions in regard to the death of R. C. Kingery.

At this time the Legislative Committee having an exhaustive report upon recommendations as to new provisions in the city electrical code, the meeting was turned over to the chairman of the Legislative Committee, F. C. Green, and the balance of the evening was devoted to the discussion of part of the proposed changes, the discussion lasting until ten o'clock, at which time, on account of the lateness of the hour, the meeting adjourned without completing discussions and recommendations in regard to the proposed revision.

The Electrical Get-Together Dinner at San Francisco

The electrical men of San Francisco and vicinity, to the number of 233, enjoyed a dinner and entertainment at the San Francisco Commercial Club, Dec. 13th, under the joint auspices of the Pacific Coast Section N. E. L. A. and the Electrical Development League. Major Geo. F. Sever, U. S. Engineer Corps, as toastmaster, introduced the various entertainment features and speakers in a most effective manner. The subjects of the evening included: A. H. Halloran, "N. E. L. A.," Garnett Young, "The League," M. A. De Lew, "The Contractor-Dealer," Lee H. Newbert, "The California Cooperative Electrical Campaign," R. L. Eltringham, "New Electrical Safety Legislation," and Minor Chipman, "Human Efficiency."

Great credit is due to the committee having the affair in hand for the able manner in which the arrangements were carried out and the large attendance that was attained through their efforts. The members were Albert Meinema, Earl Fisher, R. F. Behan, Clay Ingalls, Robt. Eltringham and Tom Bennett.

This is the first of a series of such mid-year dinners to be initiated by the Pacific Coast Section N. E. L. A. The paper by M. A. De Lew on contractor-dealer problems will appear in the next issue of the Journal of Electricity.

POSITIONS SOUGHT FOR ARMY OFFICERS NOW LEAVING CAMPS IN UNITED STATES

The United States Employment Service has issued an appeal to employers in need of technical and other highly trained men to take on qualified men from the commissioned and enlisted ranks of the army who are now leaving the camps. Hundreds of officers, many of the higher ranks, are asking the camp representatives and Federal directors of the Federal Employment Service for the States to assist them to obtain new employment. There also are large numbers of enlisted men qualified for professional and technical positions who are leaving the army without having positions in sight. Among the men of this high type applying at the Federal Employment Service are engineers and other technical men, executives, chemists, statisticians, purchasing agents, employment managers, cost accountants, etc. All employers wishing to get in touch with these men should communicate with the professional section, United States Employment Service, Department of Labor, Washington, D. C.

WHERE THE MEN OF THE INDUSTRY MEET

(The place where you can find where and when the other man meets. Information as to changes in officers, or additions or corrections, should be addressed to the Service Editor, Journal of Electricity. It is hoped to keep this directory up to date, so that travelers in a strange town who wish to attend the meetings of allied groups may not be misdirected.—The Editor.)

A. I. E. E.—WESTERN SECTIONS

National Officers

President—Comfort A. Adams, Harvard University.
Secretary—F. L. Hutchinson, Engineering Socity Bldg., New York City.
Meetings—Monthly.

Los Angeles Section

Chairman—J. H. Cunningham, Southern California Edison Co., Los Angeles.
Secretary—Clem A. Copeland, Bureau of Power and Light, Los Angeles.
Meetings—Second Tuesday of each month.

Portland Section

Chairman—R. M. Boykin, care North Coast Power Co., 441 Pittock Block, Portland, Ore.
Secretary—W. D. Scott, Pacific Telephone & Telegraph Co., Portland, Ore.
Meetings—Monthly.

Denver Section

Chairman—Fred J. Rankin, Colorado Pub. Utilities Com., Denver.
Secretary—Robt. B. Bonney, 603 Wyoming Bldg., Denver, Colo.
Meetings—Third Saturday of each month, from October to May, at the Denver Athletic Club. Dinner at 6:15 p.m., followed by regular meeting.

San Francisco Section

Chairman—J. C. Clark, Stanford University, Cal.
Secretary—Allen G. Jones, Rialto Bldg., San Francisco.
Meetings—Fourth Friday each month—Engineers' Club, 7 p.m.

Seattle Section

Chairman—John Harlsberger, 4015—4th Ave. N. E., Seattle, Wash.
Secretary—Glen Dunbar, City Lighting Department, Seattle, Wash.
Meetings—Monthly on third Tuesday in Chamber of Commerce Assembly Room, 9th floor, Arctic Bldg.

Spokane Section

Chairman—George Nixon, Main and Lincoln Sts., Spokane.
Secretary—G. H. Hoppin, 1128 W. Kiernan Ave., Spokane.
Meetings—Third Friday of each month.

Utah Section

Chairman—A. S. Peters, Mountain States Telephone & Telegraph Co., Salt Lake City, Utah.
Secretary—H. T. Plumb, 183 U St., Salt Lake City, Utah.
Meetings—Third Wednesday of alternate months, 8 o'clock. Assembly Room of Commercial Club, Salt Lake City.

Vancouver Section

Chairman—R. F. Hayward, Western Canada Power Co., Ltd., Vancouver, B. C.
Secretary—T. H. Crosby, Canadian Westinghouse Co., Vancouver, B. C.

A. I. E. E.—WESTERN BRANCHES

University of California Branch
Chairman—A. J. Swank, University of California, Berkeley, Cal.
Secretary—G. F. Teale, University of California, Berkeley, Cal.

University of Colorado Branch
Chairman—Albert S. Anderson, Boulder.
Secretary—Terril C. Smith, University of Colorado, Boulder.
Meetings—First and third Thursdays of each month of the school year in the Engineering Building, University Campus.

Idaho University Branch
Chairman—V. Pearson, Moscow, Idaho.
Secretary—L. J. Corbett, University of Idaho, Moscow, Idaho.
Meetings — First Wednesday evening of each month from October to June.

Oregon Agricultural College Branch
Chairman—J. A. Hooper, Oregon Agr. College, Corvallis, Ore.
Secretary—L. Happold, Oregon Agr. College, Corvallis, Ore.

Stanford University Branch
Chairman—C. H. Suydam, Stanford University.
Secretary—Frank Miller, Stanford University.

Montana State College Branch
Chairman—Roy C. Hagen, Montana State College, Bozeman, Mont.
Secretary—J. A. Thaler, Montana State College, Bozeman, Mont.
Meetings—Third Friday of every month of the school year in the Electrical Bldg.

Colorado State Agricultural College
Chairman—R. C. Richards.
Secretary—W. A. Stallings, Colorado State Agricultural College, Fort Collins, Colo.

Throop College of Technology Branch
Chairman—J. Paul Youtz, Throop Dormitory, Pasadena, Cal.
Secretary—Clark E. Baker, Throop Dormitory, Pasadena, Cal.

State College of Washington Branch
Chairman—Clarence E. Guse, Pullman.
Secretary—Ralph C. Guse, State College of Washington, Pullman.
Meetings—Bimonthly at Mechanics Art Bldg., Pullman, Wash.

CONTRACTOR-DEALER ASSOCIATIONS

National Association of Electrical Contractors and Dealers
Chairman—W. Creighton Peet.
Secretary—Harry C. Brown, 110 West 4th St., New York.
Executive Committeemen-at-Large—W. D. Kohlwey, California; Executive Committeeman—S. C. Jaggar, Portland.

British Columbia Ass'n Electrical Contractors and Dealers
President—E. Brettell, Vaucouver, B. C.
Secretary—Capt. W. J. Conway, Vancouver, B. C.
Meetings—First Tuesday of each month.

California Ass'n of Electrical Contractors and Dealers
President—H. C. Reid, 507 Montgomery St., San Francisco.
Secretary—J. W. Redpath, Rialto Bldg., San Francisco.
Meetings—Monthly.

Electrical Contractors and Dealers Ass'n of San Francisco
President—J. M. Carlson, 175 Jessie St., San Francisco.
Secretary—J. W. Asher, 601 Howard St., San Francisco.
Meetings—Monday, 12:15; Jules Sutter Cafe.

Southern California Electrical Contractors and Dealers
President—G. E. Arbogast, 724 So. Olive St., Los Angeles, Cal.
Secretary—J. E. Wilson, 425 Consolidated Realty Bldg., Los Angeles, Cal.
Meetings—Every Friday at 6:30 p.m. at the Pin Ton Cafe, 427 South Broadway.

Monterey Bay Electrical Contractors and Dealers
President—W. Cox, Santa Cruz.
Secretary—J. A. Noggle, Monterey.

Nevada Ass'n of Electrical Contractors and Dealers
President—F. V. McAvoy, 138 N. Canter St., Reno.
Secretary—R. W. Shearer, 215 Sierra St., Reno.
Meetings—Twice a month, 15th and 30th.

Oregon Ass'n of Electrical Contractors and Dealers
President—R. C. Kenney, Portland.
Secretary—J. Willis Oberender, 301-2 Dekum Bldg., Portland, Ore.

Portland Local Ass'n of Electrical Contractors and Dealers
President—J. H. Sroufe, Jaggar-Sroufe Co., Portland.

Sacramento Section, California Electrical Contractors & Dealers' Association
President—W. H. Gribble, Sacramento.
Secretary—H. Berg, Sacramento.

Utah Society of Electrical Contractors and Dealers
President—J. V. Buckle, Buckle Electrical Co., 70 E. 1st St., Salt Lake City.
Secretary—E. H. Eardley, Eardley Bros. Co., 37 E. 1st St., Salt Lake City.
Meetings—Every Friday noon at Commercial Club.

Washington Ass'n of Electrical Contractors and Dealers
President—V. S. McKenny, NePage & McKenny Co., Armour Bldg., Seattle, Wash.
Secretary—Forrest E. Smith, Seattle, Wash.
Meetings—Quarterly—second Thursdays of March, June, September and December.

JOBBERS' ASSOCIATIONS

Electrical Supply Jobbers Association
General Secretary—Franklin Overbagh, 411 So. Clinton St., Chicago, Ill.
Meetings—Semi-annual.

Pacific Coast Electrical Supply Jobbers
President—W. S. Berry, Western Electric Company, San Francisco.
Secretary—Albert H. Elliot, 544 Market St., San Francisco.
Meetings—Quarterly.

Electrical Credit Ass'n of the Pacific Coast
President—C. L. Gilson, Gilson Electrical Supply Co., 304—12th St., Oakland, Cal.
Secretary—Albert H. Elliot, 544 Market St., San Francisco.
Meetings—annually; San Francisco; May.

OF ELECTRICAL INTEREST

California Electrical Cooperative Campaign
Chairman Advisory Committee—L. H. Newbert, 445 Sutter St., San Francisco.
Secretary—J. W. Redpath, Rialto Bldg., San Francisco.

National Electric Light Association
President—W. F. Wells, Edison Elec. Illuminating Co., Brooklyn.
Executive Secretary—T. C. Martin, 33 W. 39th St., New York City.

Nevada Section, N. E. L. A.
Chairman—Geo. A. Campbell, Reno, Nev.

Pacific Coast Section, N. E. L. A.
President—Samuel Kahn, Western States Gas & Electric Co., Stockton, Cal.
Secretary—A. H. Halloran, Journal of Electricity, Crossley Bldg., San Francisco.
Meetings—Annually, in April.

Portland Section, N. E. L. A.
Chairman — H. H. Schoolfield, Pacific Power & Light Co., Portland.
Secretary—F. H. Murphy.

Illuminating Engineering Society
President—George A. Hoadley.
Secretary—Clarence L. Law.
Western Representatives—Romaine Myers, Bacon Bldg., Oakland, Cal.; C. M. Masson, Edison Bldg., Los Angeles; F. H. Murphy, Portland Railway Light & Power Company, Portland, Ore.; W. R. Putnam, Utah Power & Light Company, Salt Lake City; Fred A. Osborn, University of Washington, Seattle, Wash.
Meetings—First Tuesday each month.

New Mexico Electrical Association
President—M. R. Buchanan, Silver City, N. M.
Secretary—E. M. Haggerson, Silver City, N. M.
Meetings—Annually, in February.

Southwestern Electric and Gas Association
President—W. A. Sullivan, Shreveport, La.
Secretary—H. S. Cooper, 403 Slaughter Bldg., Dallas, Texas.

Northwest Electric Light and Power Ass'n
President—L. B. Faulkner, Olympia Light & Power Co., Olympia, Wash.
Secretary—Geo. L. Myers, 1212 Spalding Bldg., Portland, Ore.
Meetings—Convention held annually. Executive Committee, governing body of Association, meets upon call of its chairman.
New officers announced later.

Los Angeles Jovian Electrical League
President—A. E. Peat, San Joaquin Light & Power Corp.
Secretary—Frank Weiss, Los Angeles Gas & Electric Corp.
Meetings—Every Wednesday, 12 m.

San Francisco Electrical Development League
President—Garnett Young, 612 Howard St., San Francisco.
Secretary—J. W. Redpath, Rialto Bldg., San Francisco.
Meetings—Every Monday, 12:10 p.m.; luncheon, Palace Hotel.

Electric Metermen's Association
President—J. E. Bridges, Westinghouse Electric & Manufacturing Company.
Secretary—A. E. Coney, Great Western Power Company, San Francisco.
Meetings—About every 60 days.

Alameda County Electrical Club
President—George Drew, Pacific States Electric Company, Oakland, Cal.
Secretary—George B. Furniss, Pacific Gas & Electric Company, Oakland, Cal.

Synchronous Club
Secretary—H. N. Beecher, City Hall, L. A.

Telephone and Telegraph Society of the Pacific Coast—San Francisco Section
President—W. H. Brammage, Pacific Tel. & Tel. Co., San Francisco.
Secretary—Chas. H. Dodson, 835 Howard St., San Francisco.

MECHANICAL ENGINEERS

National Officers
President—Charles T. Main, Engineering Society Bldg., New York City.
Secretary—Calvin W. Rice, Engineering Society Bldg., New York City.

San Francisco Section, A. S. M. E.
President—E. C. Jones, Pacific Gas & Electric Co., San Francisco.
Secretary—Geo. L. Hurst, Bethlehem Ship Bldg. Corp., Ltd., San Francisco.
Meetings—Quarterly.
Thursday lunches have been arranged at the Engineers' Club, 57 Post St.

Los Angeles Section, A. S. M. E.
President—Charles H. McGuire.
Secretary—T. J. Royer.
Meetings—Quarterly.

ENGINEERS' CLUBS

Oregon Society of Engineers
President—Orrin E. Stanley, Box 973, Portland, Ore.
Secretary—C. J. Hogue, Box 973, Portland, Ore.
Meetings — Annual: Feb. 4, 1918. Monthly: Third Thursday of each month.

The Engineers' Club of Seattle
President—J. F. Pinson, Seattle, Wash.
Secretary—E. J. Bartells, Northern Life Bldg., Seattle, Wash.
Meetings—Thursday noon at the club rooms at 410 Arctic Bldg. A buffet luncheon is served every day. A special welcome is extended to all engineers visiting the city.

Engineers' Club of San Francisco
President—A. E. Chandler, New Call Bldg., San Francisco.
Secretary—J. R. Brownell, 525 Market St., San Francisco.
Annual Meeting: October.

Idaho Society of Engineers
President — W. H. Gibson, Mountain Home, Idaho.
Secretary—Ira F. Shaffner, Boise, Idaho.

Engineers' Club of Oakland
President—R. S. Chew, Oakland Chamber of Commerce, Oakland.

Engineers' Club of Sacramento
President — George S. Nickerson, 914 Forum Bldg., Sacramento.
Secretary—P. M. Noeboe, State Department of Engineering, Forum Bldg., Sacramento.

United Engineering Societies of San Francisco
Chairman—C. D. Marx, Stanford University.
Secretary—Nathan Bowers, Rialto Bldg., San Francisco.

MISCELLANEOUS

American Ass'n for the Advancement of Science—Pacific Division
President—D. T. MacDougal, Director Desert Laboratory, Carnegie Institution, Tucson, Arizona.
Secretary (acting)—J. R. Douglas, 430 Library, University of California, Berkeley, Cal.
Meetings—Annual.

Portland Section A. S. C. E.
President—P. H. Dater, Eng. U. S. Forestry Service.
Secretary—C. P. Keyser, Park Bureau, Portland, Oregon.
Meetings—At call of president.

Spokane Engineering & Technical Ass'n
President—J. C. Ralston, E. M., E. E.

Foreign Trade Club
President—W. H. Hammer, Monadnock Bldg.
Secretary—Wm. E. Hague, Monadnock Bldg.
Meetings—238 Merchants Exchange Bldg., San Francisco. Every Wednesday evening.

Pacific Coast Gas Association
President—John D. Kuster, care Pacific Gas & Electric Co., San Jose, Cal.
Secretary—Henry Bostwick, 445 Sutter St., San Francisco.

Society for Promotion of Engineering Education
Secretary—F. L. Bishop, University of Pittsburgh, Pittsburgh, Pa.

HAPPENINGS IN THE INDUSTRY

CAPITAL ISSUES COMMITTEE

Washington, December 25.—The Capital Issues Committee of the Treasury, the Government's war agency for the suppression of unessential security issues, has announced that it will suspend activities on December 31 and remain inactive until dissolved unless called back into service by developments.

NEW TELEGRAPH LINES BETWEEN JAPAN AND MANCHURIA

The communication between Japan and Manchuria has increased so much of late that the present telegraph lines are quite inadequate. A proposal has been made to add a new route besides the existing two routes. The new route will reach Manchuria via Chosen and will be completed within two years, the total cost being 840,000 yen ($420,000).

RESOLUTIONS ON THE DEATH OF SQUIRE V. MOONEY

The following resolution has been adopted by John A. Roebling's Sons:

We, the Board of Directors of the John A. Roebling's Sons Company of Trenton, New Jersey, wish to express our deep regret and great loss occasioned by the death of Mr. S. V. Mooney of San Francisco, who died August 29, 1918.

Mr. Mooney came into our employ in 1879 from a prominent position with another organization and, being then possessed of a valuable knowledge of pioneer conditions of the West, he became our agent at Virginia City, Nevada.

Keen of perception, with an unusual future perspective, his unerring judgment rapidly led us into an expanding western business. It was our pleasure to repeatedly advance him to more important positions of trust and responsibility and, finally, to appoint him to the place which he occupied at the time of his death, that of President of the John A. Roebling's Sons Company of California, in control of our entire Pacific Coast trade, with branches at Seattle, Portland, San Francisco and Los Angeles.

During almost forty years of continuous service we have found Mr. Mooney to be a faithful employe, a man of sound judgment and absolute integrity, discharging thoroughly and with a willing spirit his every obligation. As a real founder of our western trade, we have for many years looked upon him in a peculiar sense as one of our most confidential advisers.

Untiring in his efforts in our behalf and ever mindful of our interest, yet he possessed those rare traits of character which commanded the respect of the trade and endeared him to the corps of assistants, of which he was the employer and executive head. His splendid history with us has compelled us to regard him as a man of exceptional worth, and we mourn Mr. Mooney's loss as that of a real personal friend.

TRADE NOTES

A Change of Location —

The McGlauflin Manufacturing Company, manufacturers of insulator pins, pole tops and the like, formerly located in San Rafael, has moved its plant to Petaluma.

A New Calendar —

The Youngstown Sheet & Tube Company's annual calendar for 1919 is out and is, perhaps, the handsomest of the interesting series issued by that company. It contains twelve new views 8 by 15 inches, in two colors, each showing one of the spectacular operations in a modern steel mill. The illustration on the front page is a night view of the main plant while it was speeded up on war work and flood-lighted as a war time precaution. This picture was made from a photographic plate which had been exposed two hours and is regarded as an especially fine example of night photography.

A Sales Conference —.

During the week ending December 7th, The Cutler-Hammer Manufacturing Company held a five-day sales conference in Milwaukee for the benefit of its men who direct the district office sales of wiring devices, push button specialties, and molded insulation. The conference was in charge of Mr. W. C. Stevens, sales manager, Mr. A. H. Fleet, manager of Wiring Devices Department, and Mr. Ed. Karl. New devices, methods of manufacturing wiring devices and molded insulation products, advertising and selling plans with special reference to increased sales during the reconstruction period, were some of the important subjects taken up.

Personal Items —

L. E. Townsley, manager of the Foreign Trade Department of Paul R. Ruben & Company, San Francisco, leaves the last of January for China, Japan, Philippines, Dutch East Indies, Straits Settlements and Australasia, to establish resident agents at principal ports.

The Edison Storage Battery Company of Orange, New Jersey, announces the appointment of **Geo. F. Simons** as district sales manager of their Detroit district. Mr. Simons succeeds Mr. Bertram Smith, who was recently called to the main office at Orange, New Jersey, in the capacity of assistant general sales manager.

Geo. A. Hughes, president of the Edison Appliance Company, is a member of the Rotary Club of Chicago and in a recent Christmas publication of that organization was listed with his picture and a brief description of the products of his company. The roll call of members and this brief advertisement was most effective and suggests a method of cooperation which might be carried out by Rotary clubs farther West.

Prescott C. Ritchie, western representative of the Westinghouse Automobile Equipment Department, moved his headquarters from Indianapolis to the Conway Building, Chicago, on December 1st. Mr. Ritchie has had extensive

experience in auto electric equipment here and has been with the Westinghouse Electric Company for several years.

M. Frankel, now manager of the Chicago office of the Roller Smith Company, has been promoted to the position of assistant sales manager.

J. F. Killeen has become associated with the Edison Electric Appliance Company, Inc., having resigned from the Rathbone, Sard Electric Company of Albany, N. Y., of which he was vice-president and sales manager. The Edison Electric Appliance Co. will have the benefit of his broad experience in the heating device business, of which he has an exceptional grasp, plus a quick, intuitive judgment ripened in a varied career touching many phases of life, all of which makes him a keen and unusually accurate judge of situations involving the human element. In 1907 Mr. Killeen decided to get into the electric business, starting from the bottom. Coming from Troy, N. Y., where he always lived, he began with the General Electric Company at Schenectady, in the manufacturing department. Rapidly passing through various positions in the production, advertising and heating device commercial departments, he became manager of the last in 1915, leaving in 1916 to become vice-president of the Rathbone, Sard Electric Company, a subsidiary of the makers of the well-known "Acorn" coal and gas ranges. Mr. Killeen has a wide acquaintance and many friends among commercial central station men and electrical jobbers.

RECONSTRUCTION CONVENTION OF THE CHAMBER OF COMMERCE OF THE UNITED STATES

A new and powerful federation of American industries was created at the Reconstruction Congress of Industrial War Service Committees which has recently come to an end at Atlantic City. This Association, made up of the nearly 400 War Service Committees that were formed under the direction of the Chamber of Commerce of the United States, was created by the Committees to act in the future as the spokesman for industry before the Government just as the Committees acted separately as the point of contact between the industry and the Government during the war period.

The Federation voted to function under direction of a Committee of the Chamber of Commerce and it will have back of it and serving it the Chamber's organization. When necessary it will have, too, the benefit of the weight of the expression of the membership of the Chamber. The chairman of the War Service Committees will sit as an Industrial Advisory Council to the organization.

The views of this assemblage of industries respecting industrial readjustment were expressed at Atlantic City in a series of resolutions covering the most important subjects that today engage the attention of business men. These resolutions, most of them adopted without a dissenting voice, are given in part as follows:

Cancellation of War Contracts

It is in the public interest that all war orders placed by any contracting agency of the government and accepted in good faith, whether formally and regularly executed or not, should, upon cancellation by such contracting agency, be promptly and equitably adjusted and satisfied as if every formality had been observed, and when so adjusted the amount ascertained to be due by the government should be promptly paid, to the end that these funds may be utilized by the industries of the country to speed their transition from a war to a peace basis.

Removal of Restrictions on Industry

It is in the public interest that all war regulations of industry should be revoked, and all war restrictions on industry should be removed, as speedily as practicable, save in the case of such industries as are engaged in the production, preparation or distribution of foods, feeds, and fuel, and such last-named group of industries should be freed from war regulations and restrictions as early as consistent with the welfare of this nation and the Allies.

Pivotal Industries

It is essential that the government should at once proceed to ascertain the industries which have been developed during the European war and ascertain those the maintenance of which is indispensable for the safety of our industrial structure and our military establishment.

When these pivotal industries have been ascertained, means suitable in view of their nature and situations should at once be provided for their encouragement and preservation.

Industrial Cooperation

The war has demonstrated that through industrial cooperation great economies may be achieved, waste eliminated, and efficiency increased. The nation should not forget, but rather should capitalize, these lessons by adapting effective war practices to peace conditions through permitting reasonable cooperation between units of industry under appropriate federal supervision. It is in the public interest that reasonable trade agreements should be entered into, but the failure of the government either clearly to define the dividing line between those agreements which are, and those which are not, in unreasonable restraint of commerce, or to provide an agency to speak for it on application of those proposing to enter into such agreement, in effect restricts wholesome cooperation and deprives both industry and the general public of its benefits. The conditions incident to the period of readjustment renders it imperative that all obstacles to reasonable cooperation be immediately removed through appropriate legislation.

Federal Trade Commission

The Federal Trade Commission was advocated by the President, and was created, as an agency to make the administration of our trust legislation explicit and intelligible, and to provide "the advice, the definite guidance and information" which business enterprises require. The normal importance of the Commission's task is now tremendously increased by the imperative need for wholehearted and sympathetic cooperation between the government and industry, especially during the readjustment period, and suggests the desirability of the two existing vacancies in the Commission's membership being promptly filled with able men of broad business experience and clear vision, prepared to assist actively in discharging these tasks along constructive lines.

Industrial Relations

The convention heartily endorses in letter and spirit the principles of the industrial creed so clearly and forcibly stated in the paper read to it Thursday morning by Mr. John D. Rockefeller, Jr., and urges upon all units of industry,—where they may not now be employed,—the application of such principles. Without approving or rejecting his particular plan or machinery, the principles advanced by Mr. Rockefeller are as follows:

1. Labor and capital are partners, not enemies; their interests are common interests, not opposed, and neither can attain the fullest measure of prosperity at the expense of the other, but only in association with the other.

2. The purpose of industry is quite as much to advance social well-being as material well-being and in the pursuit of that purpose the interests of the community should be carefully considered, the well-being of the employes as respects living and working conditions should be fully guarded, management should be adequately recognized and capital should be justly compensated, and failure in any of these particulars means loss to all.

3. Every man is entitled to an opportunity to earn a living, to fair wages, to reasonable hours of work and proper working conditions, to a decent home, to the opportunity to play, to learn, to worship, and to love, as well as to toil, and the responsibility rests as heavily upon industry as upon government or society to see that these conditions and opportunities prevail.

4. Industry, efficiency, and initiative, wherever found, should be encouraged and adequately rewarded and indolence, indifference, and restriction of production should be discountenanced.

5. The provision of adequate means for uncovering grievances, and promptly adjusting them, is of fundamental importance to the successful conduct of industry.

6. The most potent measure in bringing about industrial harmony and prosperity is adequate representation of the parties in interest; existing forms of representation should be carefully studied and availed of in so far as they may be found to have merit and are adaptable to the peculiar conditions in the various industries.

7. The application of right principles never fails to effect right relations; the letter killeth and the spirit maketh alive; forms are wholly secondary while attitude and spirit are all important, and only as the parties in industry are animated by the spirit of fair play, justice to all, and brotherhood, will any plans which they may mutually work out succeed.

8. That man renders the greatest social service who so cooperates in the organization of industry as to afford to the largest number of men the greatest opportunity for self-development and the enjoyment by every man of those benefits which his own work adds to the wealth of civilization.

Relocation of Labor

The conversion of the industry of the country from a peace basis to a war basis involved a general and important dislocation of labor. This movement was gradual. The end of the war involves a much more rapid change in industry; while there will be a great demand for labor to meet the foreign and domestic requirements there may be for a time in special places a temporary condition of unemployment.

In the new relations of industry to labor we conceive it to be incumbent upon the community affected promptly to meet such conditions.

The local chambers of commerce should be able to contribute in an important way in this work.

Public Works

The development of public works of every sort, as recommended by the President, should promptly be resumed, in order that opportunities of employment may be created for unskilled labor.

Taxation

The cessation of hostilities brings to business interests a feeling of deep concern in the matter of taxation. The problems of readjustment are made more difficult through inequalities in the present law.

We believe, therefore, that in the consideration of amendments to the present act, or the passage of new revenue legislation, the Congress should give most careful consideration to the views expressed by organizations of commerce and industry. Ability to pay, inventory values, and proper reserves, together with careful survey of the amount of revenue required under the new conditions, are matters of vital importance to business interests of the nation during this readjustment period.

Inventories

We urge that Congress should give careful consideration to the grave menace now facing all industry due to the fact that both raw materials and finished goods are carried in full measure to meet the extraordinary requirements of the government and of the people, and that in large part the stocks have been acquired at abnormal cost and are therefore carried into inventories at inflated values, thereby showing apparent profits which have not been realized, and which probably will never be fully realized. These are largely bookkeeping or "paper" profits, and should not be used as a basis for taxation.

We therefore recommend that any tax law shall provide that during present conditions the taxpayer shall be allowed to make a deduction from his apparent profit by way of a reserve for a subsequent shrinkage in the value of merchandise.

We believe that the interests of the government can be protected against abuse of this privilege by the fixing of a maximum percentage of deduction to be allowed, and by the use of proper methods of inspection and appraisal.

Railroads

The Congress of the United States should speedily enact legislation providing for the early return under federal charters to their owners of all railroads now being operated by this government under federal regulations permitting the elimination of wasteful competition, the pooling of equipment, combinations or consolidations through ownership or otherwise in the operation of terminals, and such other practices as will tend to economize without destroying competition in service.

Means of Communication

We are opposed to government ownership and operation of telegraphs, telephones, and cables.

Merchant Marine

We recommend that the construction of a great merchant marine be continued and amplified, and that its operation under American control be kept safe by such legislation as may be necessary to insure its stability and its lasting value to American industries.

Public Utilities

Public utilities have faced difficult problems, which have been accentuated by conditions arising out of war. The development and efficiency of such a utility as local transportation has immediate importance for every community. It is recommended that the Chamber of Commerce of the United States should appoint a committee to investigate and study the question of local transportation as it relates to the control of rates and service, franchises, taxes, the attraction of capital into the business, and such other questions as the committee may find pertinent. Such a committee should report its recommendations to the Board of Directors of the National Chamber, and the Board should deal with them in accordance with the established procedure of the Chamber.

Water Powers

Industrial activity is dependent upon the available supply of power. A bill which would effect the development of hydroelectric power upon waterways and lands which are subject to Federal jurisdiction is now before a committee of conference between the two Houses of Congress. It is important in the public interest that Federal legislation on this subject should be enacted without further delay. We accordingly urge that the conference committee arrive at an acceptable form of legislation in season for enactment at this session of Congress.

Markets for Foreign Trade

We strongly urge upon our government the vital necessity of encouraging and developing our foreign trade through all appropriate means possible, in order that the production of industry may afford employment to wage earners and prosperity to the nation.

Cost Accounting

It is the sense of this Convention that a system of uniform cost accounting should be adopted by each industry.

National Trade Association

The experiences of the war have clearly demonstrated the value of national trade organizations and their service to the country as well as to industry.

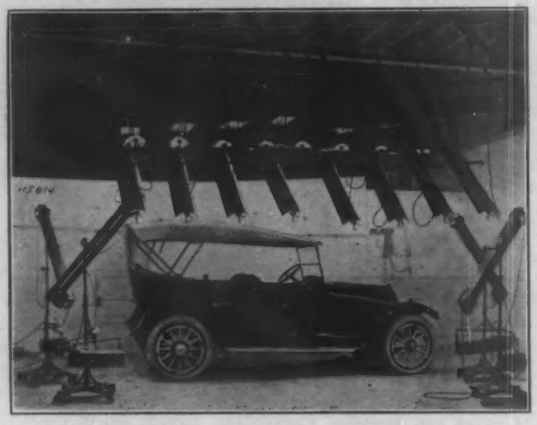
This conference heartily approves the plan of organizing each industry in the country in a representative national trade association and expresses the belief that every dealer, jobber, manufacturer, and producer of raw materials should be a member of the national organization in his trade and cordially support it in its work.

LATEST IN EVERYTHING ELECTRICAL

(Electricity has many applications to the photographer's art, of which a rather new feature is here recorded. Suggestions for coal saving by the prevention of smoke and a valve control which is motor operated and may be controlled from a distance are further taken up as appropriate to the needs of the present period.—The Editor.)

MERCURY VAPOR LAMPS TO PHOTOGRAPH OVERLANDS

For several reasons an automobile is a difficult subject for studio photography. On account of its size, a large light-source is needed and since its color is usually black, blue, red or some other dark color, plenty of light must be available.



Photographing a car with mercury vapor lamps

Then there are often details in the shadows which must be shown to the satisfaction of the salesmen, who are accustomed to scrutinize photographs closely.

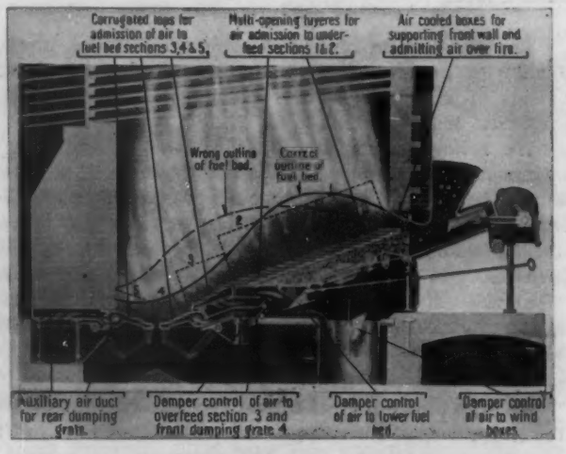
All these points have been met by an installation of 20 Cooper-Hewitt mercury arcs in the studio of the Willys-Overland Company at Toledo. Eight lamps are suspended horizontally over the car and eight at an angle of 45 degrees. This general illumination is reinforced by four tubes mounted on individual stands, placed so as to light up spots which need extra intensity. Owing to their highly actinic light, these lamps shorten the exposure, while their form increases the diffusion of the light, and so eliminates the reflection of bright spots on the side of the car.

SMOKE PREVENTION — COAL SAVING SUGGESTIONS

Just at this time when the conservation of coal is under special consideration, every one realizes that smoke issuing from boiler stacks represents unused heat units, but everyone does not realize that certain simple rules, if observed in the fire room, will materially decrease this loss. The suggestions herein are based on many years' experience of the Westinghouse Electric & Manufacturing Company's combustion engineers and are briefly outlined below.

1. Give your fireman an opportunity to acquire the fundamental principles of fuel burning.
2. If you have a difficult fuel problem, consult a combustion engineer.
3. Prevent smoke by proper firing methods.
4. Use gauges to indicate exactly the condition of fire bed at all times. As a minimum these gauges should consist of draft gauge indicating draft in furnace above fuel bed, draft gauge indicating draft at boiler side of flue damper and a steam meter for individual boilers.
5. CO_2 is the principle product of complete combustion of coal. Ten to twelve per cent CO_2 should be obtained in flue gases to insure minimum fuel loss.
6. Avoid loss due to unburned coal in the ash.
7. If you are wasting exhaust steam, you are wasting coal.
8. Do not permit grates to clog. A systematic method of keeping the air spaces clean must be followed.
9. Inspect the baffles in boilers, as broken or leaky baffles raise the flue gas temperature and waste coal.
10. Avoid leaking in of cold air around boiler setting.
11. Install stokers. Hand firing is rapidly being recognized as an obsolete and wasteful method of firing.
12. Clean scale from tubes, as every particle of scale represents wasted coal.
13. Avoid soot formation. All boiler tubes should be blown externally once every eight hours when in continuous service.
14. All smoke flues should be as short and straight as possible. Flues should also be made air tight and all joints and connections should be well fitted, caulked and riveted. Use asbestos gaskets on clean-out doors.
15. Locate flue dampers in front of boiler so that fireman will adjust them as required. Dampers located in rear of boilers are seldom disturbed, regardless of condition.
16. The size of coal has much to do with capacity and efficiency of boilers. In general, the air pressure penetrates the fuel bed formed by coarse coal easier than that formed by finer coal, resulting in disturbance of best furnace conditions.

In addition to the above suggestions, the following "Don't fail to do" list should be followed:


Corrugated tops for admission of air to fuel bed sections 3,4 & 5.
Multi-opening tuyeres for air admission to under-fired sections 1 & 2.
Air cooled boxes for supporting front wall and admitting air over fire.
Wrong outline of fuel bed.
Correct outline of fuel bed.
Auxiliary air duct for rear dumping grate.
Damper control of air to overfeed section 3 and front dumping grate 4
Damper control of air to lower fuel bed.
Damper control of air to wind boxes.

Typical fire bed—stoker fed

Don't fail to—

Keep the heating surfaces of the boilers free from soot, scale or oil.

Keep the fires level and free from holes.

Do not carry the fires so thin as to draw a lot of excess air through.

Do not carry the fires so thick as to have incomplete combustion of the coal.

Do not soak the coal with water before firing.

Be sure the blow-off valves do not leak.

Do not have the safety valve popping off continually.

Cover steam pipes.

Do not waste steam through leaky valves or traps.

Never use live steam if exhaust steam is available and can be used as well.

An observance of the foregoing simple rules and suggestions should materially reduce the coal consumption of the average plant.

INSTALLATION OF DEAN VALVE CONTROLS

Motor-operating mechanisms have been applied to numerous water and steam valves, especially those of large size and where it was desirable to operate the valves from a distant point. However, only recently have they been used for purely industrial applications.

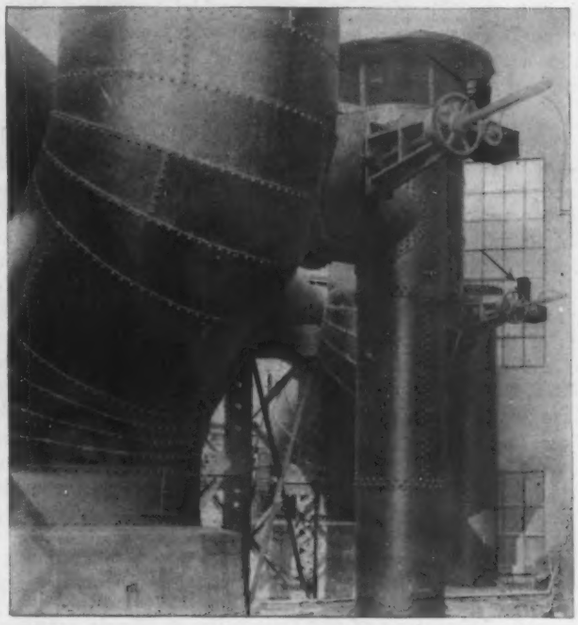
Electrical engineers of steel plants will be particularly interested in the accompanying illustration which shows two Dean Valve Controls on the delivery side of the blowers which supply air to the blast furnace of the Mark Manufacturing Company's new plate mill near Indiana Harbor, Indiana. The air for the blast furnace is supplied by two Ingersoll-Rand 5 stage turbo blowers rated at 4000 h.p. with a speed of 2250 to 2800 r.p.m. and an air delivery of 34,400 to 55,000 cubic feet per minute, at 14 pounds pressure. The air is taken in through two 72-inch intakes, the screened top of one of which may be seen in the illustration. The two discharge lines are 36-inches in diameter and lead from the blowers in the power house to the main discharge line just outside. There are two 36-inch gate valves located at the point where the 36-inch lines enter the 48-inch main discharge line.

From the illustration it will be seen that the valves are placed approximately 15 feet above the ground, hence they would be very inaccessible to operate by hand, besides it would be very inconvenient to operate the steam throttle on the turbo blowers and valves simultaneously. At least two attendants would be required to close the throttle of the turbine and the gate valve at anywhere near the same time. In order, therefore, to make the operation of the valves convenient and to guard against any serious irregularities of the air flow to the blast furnace, two Dean Valve Controls were installed in the two 36-inch discharge lines with the valve control stations located near the turbine throttles. With this equipment the engineer can start the turbine and then, by merely placing the handle of the valve control station in the open position, open the corresponding discharge valve. This convenient and speedy control is especially desirable when changing from one turbine to another. The importance of being able to open and close these two valves very rapidly will be appreciated when one remembers that blast furnaces are very seldom shut down, while it is often necessary or desirable to shut down a turblo-blower.

The Dean Valve Control is made by The Cutler-Hammer Company of Milwaukee and New York. Primarily, it consists of a high torque squirrel cage motor, limit switches with special gear arrangement and one or more control stations.

The Dean System is entirely electrical in operation, using a fully enclosed motor as the source of power. This motor runs at a speed of about 1600 revolutions per minute and is connected to a system of combined worm and planetary gearing for the purpose of speed reduction to the valve stem. The gearing is enclosed in an oil-tight casing and the limit mechanism is included in a space above the gearing, the whole, together with the motor, forming a single unit with only four bolting down holes. All cables from the motor to the limit switch are encased in steel conduit and the unit is as impervious to moisture as it is possible to make it. The motor is easily removable from the casing and can be changed in a few minutes.

The weak feature of most electrical valve controls is the inability to securely seat the gate under all conditions, caused by the motor circuit being interrupted before the limit of travel is reached and the gate being allowed to drift into its seat. This drift is a most uncertain quantity and it is dependent on friction of the moving parts. The Dean System drives the valve gate directly into the seat, under power, and to the exact point of tight closing, after which the trip mechanism releases the motor and gears from the valve stem, thus entirely eliminating over-travel, due to momentum of moving parts. It is this momentum that is the cause of jamming the gate.



An installation of a motor operated and remote controlled valve in a plate mill

Control of the valves is secured by small control stations, placed in heavy cast iron boxes suitable for attaching to a wall or floor standard, and as many points of control as is desired, for one valve, may be obtained, at any distance from the valve. Each station is fitted with indicating lights showing the position of the gate.

The application of the Dean System to an existing standard gate valve is accomplished by furnishing a new yoke and a pair of driving gears and may be installed without putting the valve out of service. It is particularly adaptable to valves of the outside screw and yoke type since pads for the support of the unit may be welded onto the existing yoke.

MISCELLANEOUS BULLETINS

The National Motor Truck Committee of the National Automobile Chamber of Commerce, New York, has issued pamphlets urging the initiation of Rural Motor Express Lines throughout the country to alleviate the congestion on the railroad lines. The patriotic duty of helping get food from our farms to our allies is the keynote of the literature. Copies will be furnished to all applicants by the committee.

The University of Chicago Press has prepared a catalogue of books, pamphlets and journals published at the University for the academic year 1918-19. They are classified as Single Titles, Serials, Agency Lists and Journals, and the catalogue is indexed by titles and by authors.

The Department of the Interior has published No. 3 of the series of lists of Engineering Articles. The list is reprinted from the fifteenth and sixteenth annual reports of the United States Reclamation Service, for the information of engineers and others interested in the work.

BOOKS AND BULLETINS

Prevention of Rusting

"The Prevention of Rusting or Corrosion of Iron and Steel" is the title of an attractive booklet recently published by the Dearborn Chemical Company of Chicago. The pamphlet describes at length the list of specialties which the company is at present putting on the market.

Cutler-Hammer Pamphlet

"Miscellaneous Applications of Electrical Heat by Means of Standardized Units" is the title of a new four-page descriptive pamphlet being distributed by The Cutler-Hammer Manufacturing Company of Milwaukee. These standardized heating units are known as C-H Space Heaters. They are about the same size as two feet of lath. The blueprint which accompanies the new pamphlet gives all the dimensions of these standardized units. The pamphlet makes special mention of the great variety of applications of these units, important among which are: Crane and hoist cabs, meter houses, watchman houses, detached or exposed rooms, storage house offices, freight house offices, temporary construction offices, valve houses, sprinkler riser houses, mines, where explosives are present, where open flame would be dangerous, for keeping oils free to flow, drying rewound motor armatures, for table men and shear men in steel plants, for keeping automobile and motor truck engines warm.

Loss of Head in Small Valves

As a part of the experimental work conducted in the Hydraulic Laboratory of the University of Illinois a number of problems have been investigated. The results of four such problems have been published by the Engineering Experiment Station of the University of Illinois as Bulletin 105.

Part I of the bulletin, "Loss of Hydraulic Head in Small Valves," by Professor Arthur N. Talbot and Fred B. Seely, presents the results of experiments on the flow of water through 1-in. and 2-in. gate valves, 1-in. and 2-in. globe valves and 1-in. and 2-in. angle valves. Part II, by Professor Fred B. Seely, presents the results of experiments on submerged sharp-edged orifices of various shapes and sizes discharging under moderately low and under very low heads. Part III, "Fire Streams from Small Hose and Nozzles," by Professor Virgil R. Fleming, presents the results of experiments on 1½-in. hose and nozzles, both rubber-lined and unlined linen hose being used. Part IV, by Professor Melvin L. Enger, describes the orifice bucket as a means of measuring water and presents experimental data to indicate that the device is reliable for use in engineering practice.

Inspected Electrical Appliances

The National Board of Fire Underwriters sends out a supplemental list of inspected electrical appliances to complete the list of April, 1918.

Return Post Card

A return post card sent out by the Benjamin Electric Manufacturing Company points out the possible use of the little colored posterettes which the company is prepared to furnish for sticking on bills and letters, on packages and in windows.

Space and Speed in Steel Buildings

The Milliken Brothers Manufacturing Company, Inc., Woolworth Building, New York, has just published a new illustrated book entitled "Space and Speed in Steel Buildings," giving a description of the "Standardized Truss System" of building construction, designed and manufactured by the company. This system of erection is suitable for all classes of industrial and manufacturing buildings, making use of a simple, common structural steel unit, both for columns and trusses. No plans are necessary, and the buildings are either permanent or portable. The system makes possible low transportation and erection costs. The book shows a number of interesting halftones, illustrating different buildings of this type constructed for the United States Government.

Simplex System

The Simplex Surface Contact Company, of Williamsport, Penn., has issued an attractive bulletin on the Simplex System as applied to the electrification of railways and cranes. The booklet is profusely illustrated and includes an inquiry sheet for the convenience of those wishing further information.

Vul-Cot Fibre

Two catalogs on Vul-Cot Fibre, one of general application and the other covering special parts for electrical, mechanical, automobile and railroad uses, have recently been issued by the American Vulcanized Fibre Company of Wilmington, Delaware.

Starting Switch for A.C. Squirrel Cage Motors

A novel two-page two-color envelope folder which illustrates and enumerates the advantages of the C-H 91-16 Starting Switch for A.C. Squirrel Cage Motors, is being distributed by The Cutler-Hammer Manufacturing Company of Milwaukee. This enclosed motor starting switch, which has been previously illustrated and described in the pages of the Journal of Electricity, has a steel case which entirely encloses the mechanism and fuses with only the operating handle extending through and is so constructed that the operator cannot come in contact with any live parts. The switch is automatically locked in the open position when the fuses are exposed and the fuses are made dead. These starting switches may be operated by an unskilled worker, either man or woman, and safety stop buttons may be placed at various locations so that in case of a dangerous machine the operator or others may push one of these buttons and bring the machine to rest, should an accident occur. The folder gives all necessary dimensions for installation and the ratings for use with standard as well as high torque motors.

Quality of Gas and Gas Lamp Efficiency

A new publication of the Bureau of Standards, Technological Paper 110, is entitled "The Influence of Quality of Gas and Other Factors upon the Efficiency of Gas Mantle Lamps." This paper discusses the various conditions such as gas quality, gas pressure, gas adjustment and air adjustment, which affect the operation of mantle lamps, and describes the methods and apparatus employed to control these variables and study their separate effects. The results obtained are given and their application to practical operation is touched upon. The work of other investigators upon various phases of the same problem is briefly summarized.

A Year Book

The Western Electric Company has not allowed these unusual war times to interfere with its established practice of putting out its annual catalog. This 1919 Year Book is more complete than previous editions, and in addition to the listing of electrical supplies and equipment it contains 24 pages of tables and useful information.

Bureau of Standards Papers

"Electrical Oscillations in Antennas and Inductance Coils" is the subject of paper No. 326 of the Bureau of Standards of which John M. Miller, Associate Physicist, is the author. The object of the paper in general is to apply the theory of circuits having uniformly distributed electrical characteristics to antennas—and point out the resultant effects.

Change of Prices

Announcement of a change of prices which has been in effect since Nov. 5th in response to rapidly mounting manufacturing costs is made by the Edison Electric Appliance Company in a letter accompanying a new price list.

NEW ELECTRICAL DEVELOPMENTS

(Various activities formerly held up by the War Industries Board are now being carried out in the Intermountain District. In the Pacific Central region the interconnection between Kennett and Castella is being completed and a new power project is being carried out on the Pit River. In the Northwest the municipal ownership of street railways is pending in several of the larger cities.—The Editor.)

THE PACIFIC NORTHWEST

STAYTON, ORE.—The Stayton Electric Light Company has recently sustained a loss from fire.

SPOKANE, WASH.—The Salmon River Power & Light Company has decreased its capital stock to $50,000.

TACOMA, WASH.—Final steps in the investigation of the Lake Cushman power site are being taken by the city of Tacoma.

SPOKANE, WASH.—Universal Electric Company has been organized here with a capital stock of $10,000 by G. W. Crowder, A. E. Russell, et al.

TACOMA, WASH.—Manager Louis H. Bean of the Tacoma Railway & Power Company states that he will have ready, in about three weeks, a proposition to sell the entire street car system of Tacoma to the city.

MONTESANO, WASH.—The Northwest Electric & Waterworks is moving one unit of its power plant to the Red Mill where it is equipping a plant to insure Montesano sufficient power and light at all times and in all seasons.

SEATTLE, WASH.—The Capital Issues Committee has approved an issue of utility bonds amounting to $350,000 for completion of the loop of the municipal line at the Seattle North Pacific Shipyard and $200,000 East Marginal Way street railway bonds.

CLEAR LAKE, WASH.—Electrification of the sawmill of the Clear Lake Lumber Company at Clear Lake, Washington, is almost finished. The Allis-Chalmers Manufacturing Company installed the 1000 kilowatt steam turbine and made complete electrification of the mill.

SEATTLE, WASH.—An amended franchise has been granted the Chicago, Milwaukee & St. Paul Railway Company for the construction, maintenance and operation of an electrical power transmission pole line along certain county roads, streets and avenues in King county.

EVERETT, WASH.—The construction of two additional Soya bean tanks at the site of the Seattle-Everett Dock & Warehouse Company is one of the first steps towards increased wharf facilities at Everett. The commercial associations are enthusiastically backing the undertaking.

SEATTLE, WASH.—Plans have been completed by the engineers of the Puget Sound Traction Light & Power Company for a one-story concrete building at the Jefferson street substation to be used for housing lightning arresters. Roof and floor will be of concrete. Day labor will be employed.

PILOT ROCK, ORE.—The water and light system is being discussed here and the attorney for the city has been authorized to cover the water, light and power proposition. An election will be called for the purpose of bonding the city to raise funds for repairing the water system and for taking over the light business.

ONTARIO, ORE.—Notice has been given by the directors of the Payette-Oregon Slope irrigation district of an election to be held on the 30th of December for the purpose of determining whether 6% bonds of the district in the amount of $50,000 shall be issued to meet the deficit in maintenance for the year 1918, and to provide funds for the purchase of a new pumping unit to supplement the existing pumping machinery of the district.

SEATTLE, WASH.—The city authorities of Seattle and the Puget Sound Traction Light & Power Company are still negotiating on the point as to whether or not the principal and interest of the bonds as they fall due shall be a charge on the gross receipts of the street railway, or rather the revenues of the railway. The company is contending for the idea of their being a charge against the revenues. The sale of the lines to the company is therefore hanging fire.

SEATTLE, WASH.—Corporate name of Westerman Iron Works, Seattle, has been changed to the Bacon & Matheson Forge Company. The personnel of the stockholders, trustees and officers of the corporation remains the same. The officers are Cecil H. Bacon, president, W. Scott Matheson, vice-president and A. J. Carmody, secretary. It is the intention to install about $50,000 worth of new equipment, changing from steam to electric power. The new equipment will include an electric crane.

SEATTLE, WASH.—Operation of steam trains to the Seattle shipyards district will be discontinued on February 1, 1919, at which time the municipal elevated line will be completed, and there are 25 new cars in the municipal yards ready for service. It is expected that the city's purchase of the lines of the Puget Sound Traction Light & Power Company will be completed by that time and that the unification of the traction and present municipal lines will facilitate handling the shipyard traffic.

SEATTLE, WASH.—An official call for bids has been issued by the Port of Seattle Commission for furnishing a large Gantry electrically operated traveling crane for use on Pier "B" at Smith's Cover terminals, the new 2500 ft. pier soon to be erected by the Port of Seattle. The crane as specified by the chief engineer will cost approximately $90,500. Its capacity will be about 25,000 pounds for a 20-foot radius and 5000 pounds for the maximum 51 ft. radius. It will be of the locomotive type.

PILOT ROCK, ORE.—An open meeting of the council in which the Commercial Association and citizens in general participated was held here recently, at which time the water and light situation was thoroughly discussed. On motion, the ordinance recently drawn up covering the water question only, was rejected and Attorney Schannop was ordered to draft another ordinance that would cover the water, light and power proposition. This will be done immediately and an election called for the purpose of bonding the city to raise funds to repair the water system and take over the light business.

SPOKANE, WASH.—An investigation of the street car situation in Spokane and possible public ownership of the two traction companies is recommended in a communication made to the city council recently by Commissioner Leonard Funk. The council at Funk's suggestion requested Mayor C. M. Fasset and Corporation Counsel Geraghty to conduct an investigation and survey of the traction situation and to make any recommendations they think proper. Seven-cent street car fares, immediate betterment of service and a consolidation of the two lines are suggested by Funk and other commissioners as matters that should be investigated and placed before the people.

SEATTLE, WASH.—Councilman Oliver T. Erickson introduced a resolution in the city council authorizing the mayor, corporation counsel and chairman of the finance committee to ask for approval of a $750,000 bond issue for exten-

sions to light and power plants. The resolution specifies that the money is needed as follows: $40,000 for motor generator on elevated line, $30,000 for Ballard extension, $50,000 for switches, $200,000 for Cedar river sealing operations, $75,000 for interconnection of city power lines with Puget Sound Traction Light & Power Company's system, $120,000 for substation, $125,000 for pipe lines and $105,000 for general construction work. The resolution was referred to utilities and finance committee.

THE PACIFIC CENTRAL DISTRICT

PALO ALTO, CAL.—The Board of Public Works authorized the city engineer to proceed with the work of installing street lights in South Palo Alto.

DELANO, CAL.—R. S. Freels has purchased the electrical stock owned by Harry Young and will open an electrical shop in the building formerly occupied by the Delano Record.

REDDING, CAL.—Fifty men are now engaged in construction work in the Happy Valley irrigation district. It is estimated that $100,000 will be spent during the coming year for new work.

SACRAMENTO, CAL.—The city has rejected all bids for the construction of the proposed electrically-operated pumping station at the municipal waterworks plant. It is understood that new bids will be asked at an early date.

BROWNS VALLEY, CAL.—Steps toward a larger irrigated acreage and a preliminary survey by Government engineers to determine methods for the extension of the Browns Valley irrigation district were taken at an enthusiastic meeting held here.

HAPPY CAMP, CAL.—Mason Valley Mines Company is considering plans for the construction of a new concentrating plant at its Gray Eagle copper mines, in Siskiyou county. Considerable electrical equipment will be required in this connection.

SAN FRANCISCO, CAL.—The board of trustees of the Northwestern Electric Company has declared a quarterly dividend of $1.50 per share payable January 1, 1919, on preferred stock of record December 24, 1918. This is at the rate of 6 per cent per annum.

FRESNO, CAL.—The Kearny boulevard electrolier system—the longest lighting unit in the city—has been completed and turned over to the city. The new lighting system extends from the subway, out Fresno street to Kearney boulevard and thence to Tehama.

RICHMOND, CAL.—The Richmond division of Western States Gas & Electric Company has secured renewal of contracts with the Tilden Lumber Company for five years, the California Cap Company for three years and with the Turner Dahnken theater for five years.

SAN FRANCISCO, CAL.—Engineers Heller & Wilson, 57 Post street, report having finished plans for an irrigation project covering 500 acres in Yolo county. The same firm recently awarded contracts for a high pressure irrigation project for the Hill ranch at Bixler, Contra Costa county.

YUBA CITY, CAL.—The Chamber of Commerce is discussing plans for the construction of a reservoir in Sutter Buttes, where it is proposed to occupy 100 acres. It is to be 100 feet deep and it is believed that the reservoir, when constructed, will irrigate 1000 acres of fertile land on the lower levels.

SACRAMENTO, CAL.—The city electrical department has placed two red globes in each group of electroliers on J and K streets from the Southern Pacific station to Sixteenth street, and also on the side streets from the alleys I and J and K and L, making two rows of red lights, one on the street side and one on the side next to the buildings.

SAN FRANCISCO, CAL.—The supervisors have authorized the Board of Public Works to prepare plans and specifications and to enter into a contract for the reconstruction of railroad tracks on a portion of Taravel street, and for the construction on Brighton street between Ocean and Grafton avenues.

RED BLUFF, CAL.—The city trustees have passed the necessary resolutions for the installation of a street lighting system and have employed E. A. Rolinson of Redding to prepare plans and specifications. Material and equipment for such a system will be acquired, as negotiations for its purchase have already begun.

WILLOWS, CAL.—Resolutions were adopted by the Irrigation Districts Association of California, meeting here, recommended use of state credit for building and operating for the first few years, large irrigation projects to build power plants and sell electric power, and take steps to aid returned soldiers and sailors to settle upon the land.

ROSEVILLE, CAL.—The city trustees have fixed a minimum rate for electric current furnished for light, power and fuel, at 50 cents per month. All energy furnished by the city is under the meter plan. In many cases the amount used has not exceeded 30 cents per month, which is less than the cost of the service. The new rule takes effect January 1st, 1919.

OROVILLE, CAL.—Representatives of the Western Canal Company are investigating the feasibility of irrigating a tract of 25,000 acres lying above the canal. This includes a portion of South Thermalito and land east of Tres Vias. It is stated that this land can be irrigated by a comparatively light pumping lift. Experiments will be made in the growing of cotton on a commercial scale.

CHICO, CAL.—The irrigation system now under construction at Phelan ranch, which at first was projected to irrigate that ranch only, has been added to until it will be flexible enough to care for several thousand additional acres. Part of the water will be diverted onto the Parrott Grant. The system will call for the expenditure of approximately $125,000 and will be completed by March 1, 1919.

SAN FRANCISCO, CAL.—Funds for the construction of the Hetch Hetchy water and power project were assured to San Francisco when the Board of Supervisors accepted a bid of the Anglo-London Paris National Bank for $1,000,000 worth of the bonds at earliest maturity and gave an option on the remaining $8,051,000 serial bonds and $254,000 school 4½ per cent bonds, now in the hands of the city and county treasurer with authorization for sale.

OAKLAND, CAL.—Oakland won its year-old fight against the Great Western Power Company recently when Judge Everett J. Brown gave a decision awarding the city $69,000. The suit was over the question as to whether the company is operating under the 1913 franchise, which provides a rate of tax on three products. The decision sustained the city's contention in regard to heat and power, regarded as byproducts, but sustained the company's contention with regard to light.

REDDING, CAL.—The California-Oregon Power Company has almost completed its power line extension from Castella to Kennett. The heavy copper wires or cables are in place, and telephone wires are being strung. It is announced that power will be delivered to the Kennett smelter soon. The Mammoth Copper Company is the largest consumer of the Northern California Power Company. The power now going there will be delivered to the Pacific Gas and Electric Company for the San Francisco Bay district consumption.

SAN FRANCISCO, CAL.—The final account of John P. Coghlan, receiver of the Northern Electric Railway system, was settled recently by Federal Judge Dooling and Coghlan was ordered discharged as receiver. The account of the receiver showed that under his management the railway was thoroughly overhauled and repaired, and approximately $500,000 was put into betterments and extensions, with the result that the earnings of the system increased under the receivership more than $200,000 a year.

SUISUN, CAL.—Final arrangements for the electrification of the Rio Vista bridge, which includes the motors, generators and gears, has arrived and is being installed this week. The Great Western Power Company will erect a substation near the Rio Vista entrance to the bridge. Aside from the power supplied by the Great Western, the Pacific Gas & Electric Company will run a secondary line to the structure. Work on a joint pole line to be erected by both companies from Rio Vista to the bridge, will be started at once.

COPPER CITY, CAL.—A survey for a dam 200 feet high across Pit river, three miles beyond here, has been completed. The surveyors are located at Judge Ralston's place, 12 miles of the river, where the second dam is to be built. The unfolding of this scheme reveals plans for one of the largest electric generating plants on the Pacific Coast. It is said the power houses will be built at the first dam, and that the power will be used for the electrification of the Southern Pacific Railroad Company from Redding to Ashland, Oregon.

SAN FRANCISCO, CAL.—The Republic of China has contracted with the Marconi Wireless Telephone and Telegraph Company for the installation of 200 wireless telephone systems throughout the empire, according to E. R. Morse of the Marconi Company, who was here en route to China to superintend the installation and to conduct the service. Each of these wireless telephones will have a capacity of transmission for forty miles, Morse said. "The contract calls for the expenditure of $4,000,000, which is guaranteed by the Chinese treasury and which is repayable to the company by the year 1929. A number of American, French, British and Italian experts are now on their way to China to operate the system and to train Chinese operators."

THE PACIFIC SOUTHWEST

LONG BEACH, CAL.—An appropriation of $1800 was made by the City Council for installing lights near the harbor jetties for the benefit of local and transient mariners.

LOS ANGELES, CAL.—Plans have been prepared by Pacific Electric Railway Company for the erection of a substation, 30 ft. by 50 ft., at Maple Avenue and Seventh Street.

GLENDALE, CAL.—The Southern California Edison Company has applied to the State Railroad Commission for permission to sell part of its local system to the city of Glendale.

SAN PEDRO, CAL.—Southwestern Shipbuilding Company has had plans prepared for the construction of a new brick, steel and concrete transformer house at its works at East San Pedro.

LOS ANGELES, CAL.—The Railroad Commission has granted the Southern California Edison Company authority to issue at par $626,500 six per cent notes for refunding or renewing notes held by Southern California banks.

LOS ANGELES, CAL.—Pacific Electric Railway Company, Pacific Electric Building, has had plans prepared for the construction of a one-story brick and concrete substation, about 35 by 50 ft., to be located at Seventh street and Myrtle Avenue.

LOS ANGELES, CAL.—October earnings of the Southern California Edison Company were unfavorably affected by the influenza epidemic, which closed down many public gathering places that were supplied with power and light by the corporation.

SAN PEDRO, CAL.—Chief Electrical Engineer E. F. Scattergood recommends that the city purchase the distributing lines of the Southern California Edison Company, now serving the Municipal Pier No. 1, Smith Island and Fish Harbor in the harbor district.

SANTA ANNA, CAL.—The Southern Counties Gas Company has made plans to enlarge its plant on East First Street. Improvements to the amount of $7500 will be made including the new equipment. New construction work and alterations are estimated at $5000. Work will be started this week by Contractor J. S. Fluor.

SAN DIEGO, CAL.—Blythe, Witter & Company have just purchased an issue of $483,000 six per cent debenture, gold bonds, of the San Diego Consolidated Gas & Electric Company, authorized by the Railroad Commission and approved by the Capital Issues Committee, and will offer the bonds to investors within the next few days.

LOS ANGELES, CAL.—In connection with the proposed construction of power plant No. 2 in the San Francisquito canyon, preliminary plans have been prepared for the installation of the steel pipe line and penstock, estimated to cost in the neighborhood of $75,000. The Power Bureau of the Department of Public Service is in charge of the work.

THE INTER-MOUNTAIN DISTRICT

RENO, NEV.—The Squaw Valley Dam in western Elko county, one of the largest reservoirs in the State and the source of irrigation of over 1200 acres of alfalfa land, is to be raised 20 feet above its present height of 55 feet. The improvement will increase the capacity of the dam to 24,000 acre feet of water.

PUEBLO, COLO.—The Arkansas Valley Railway Light & Power Company will benefit through increased power business due to the Government lifting restrictions on fuel to cement plants. It is expected that the mill at Concrete will resume operations during the week.

GREAT FALLS, MONT.—Word has been received from Washington notifying Senator Walsh that the War Industries Board has reversed its ruling and sanctions the expenditure of $800,000 in the construction of a flour mill by J. F. Blecker, Ira Goodman and Charles Lewis at Broadus.

SALT LAKE CITY, UTAH.—B. Marcus Priteca, architect, Seattle, Wash., who has prepared plans for a ten-story theater and office building of fireproof construction at Salt Lake City, is asking for bids for the electric wiring and lighting fixtures, as well as for plumbing, heating and decorative plastering. This structure is for the Pantages circuit, headed by Alexander Pantages, Seattle. It is probable that other theaters of this class will be designed by Mr. Priteca for California.

BOISE, IDA.—A bond election was held in Camas recently when irrigation bonds in the sum of $675,000 to construct the irrigation works of the Camas Mutual Irrigation District were carried without a dissenting vote. The construction work on the reservoir and canal system will be begun as early in the spring as weather conditions will permit and rushed to completion as rapidly as possible.

OGDEN, UTAH.—An added area, including 40,000 acres of land, will be given to the state for agricultural purposes by the building of the irrigation project contemplated in the Uinta Basin, it is claimed, according to two applications filed with State Engineer Geo. F. McGonigle by the Uinta Irrigation & Power Company. The first application asks for 108 cubic feet per second of water from Ashley Creek and Dry Fork in Uinta County, and the area to be irrigated is 20,000 acres. It is also asked that a main canal 42,860 feet long, 24 feet wide at the top and 12 feet wide at the body with necessary laterals be constructed. The second application is for 320 acre feet of water to be taken from Ashley Creek in Uinta County to be used for irrigating an additional 20,000 acres.

POCATELLO, IDA.—The Public Utilities Commission of the state of Idaho has granted a flat increase in rates per thousand feet of gas to the Pocatello Gas & Power Company to meet increased costs of operation.

PETERSBURG, COLO.—The power house of the National Alfalfa Products Company was recently destroyed by fire.

THE VACUUM CLEANER —— THE VACUUM CLEANER

SMALL CHANGE is not of much service to pay the monthly household bills, but it comes in very handy for casual expenditures. Likewise the incidents of the day and casual happenings which form no basis for serious composition are nevertheless the exchange medium of conversation. In order to preserve some of these items which are passed along from hand to hand and are so likely to find themselves eventually in the waste basket, the Office Vacuum Cleaner is here permitted to pick over its own acquisitions and present them for your interest.—The Editor.

Once more the poet touches his lyre. This is intended as no aspersion on the characters of either E. M. Cutting, of the Edison Storage Battery Company, who wrote the poem, or H. E. Sanderson, of the Bryant Electric Company, its subject. The facts of the case are that "Sandy" as noted served most successfully as toastmaster at the recent convention of the Electrical Supply Jobbers at Del Monte and that "Uncle Ed" celebrated his achievements in song at the Christmas luncheon gathering of the San Francisco Development League on Dec. 16th. The picture is frankly a libel. (The verses should be sung to the familiar "In the Gloaming." Now, all together!)

STILL-A-MOANING

In that evening, oh, my "Sandy"!
When the lights were all so bright,
With your shoe-tree gavel handy,
Softly tapping with your right,
When the gang went wild with singing
And were howling unknown woe,
And you made us call you "Mister"
You were surely not so slow.

Mis-ter San-der-son, we love you!
Love you for the wit you are!
As a roasting Toasting Master,
All the rest, you skin by far,
For you, all our hearts are longing,
What you are, you'll always be.
It were best to leave you thus, dear,
Best for us, and best for thee.

It were best to leave you thus,
Best for us, and best for thee.

Poetry is not confined to the electrical industry, according to this tale told by one of the house papers which come into this office—it is at least quoted by the gas men. It seems that in a western town the attorney for the gas company was making a popular address.

"Think of the good the gas company has done," he cried. "If I were permitted a pun I would say, in the words of the poet, 'Honor the Light Brigade!'" Whereupon a shrill voice came from the rear: "Oh, what a charge they made!"

The origin of the word doughboy is familiar to most Americans through the explanation furnished by the Stars and Stripes, which refers the word to the shiny round buttons worn on former uniforms and resembling the boiled dumplings of sailor fare. An English explanation is brought us by Capt. R. W. A. Brewer whose work in connection with the Moorhead Laboratories is mentioned elsewhere in this issue. "The Tank," a publication issued by the members of the British War Mission in the U. S. A., suggests that the name goes back to our Mexican War in 1846 when the American soldiers occupied the deserted Mexican "adobes" which in time became "doughboys."

A still more English explanation is that it dates back to the olden days when the English foot troops wore white belts on parade and to keep them white used pipe clay, which, when it was rained on, formed a sort of dough-like substance. Hence the title.

The presence in America of the English officers and men who are back of this little paper has done much to cement the friendship of the two nations—and it is to be hoped that we will have them with us for some time still in the future.

Deadmen tell no tales, but here's one that has a tale, nevertheless, as reported by A. E. Chandler. Mr. Chandler is president of the California State Water Commission and those familiar with his writings in the columns of the Journal of Electricity will recognize that the verse is not of his own composition. It was found on a board at the head of a mound over the deadman of a cable across the Klamath River at Requa, Del Norte County, California. At first glance the mound appears to be a grave and the board a headstone.

This deadman found in the sod
Tho't I'd send his spirit to God
So buried him by the River side
Where nothing bothers him but the tide.

This deadman holds this wire
So don't call him a liar
Like him a very good man
Always do the best you can.

When the tide comes and the wind
Sure shot the Ferryman Sined
And we would travel up the river higher
Only for the deadman that holds this wire.
Amen.

A moral goes along with this smiling "beastie"—for special application to housewives and children. But then all electric appliances are blessed with good characters.

THE ELECTRIC IRON

A smiling iron smoothing out
Wrinkles as she sees them.
Folks can move her all about
She will always please them.
Children, we should mind our ways,
Never, never whining,
Being cheerful always pays—
Find the silver lining.

THE VACUUM CLEANER —— THE VACUUM CLEANER